Attachment A

Flow Frequency Analysis

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office
4949-A Cox Road Glen Allen, Virginia 23060

SUBJECT: Flow Frequency Determination / 303(d) Status
Hanover Courthouse STP – VA0062154

TO: Laura Galli

FROM: Jennifer Palmore, P.G.

DATE: May 22, 2014

COPIES: File

The Hanover Courthouse STP discharges to the Pamunkey River near Hanover, VA. The outfall is located at rivermile 8-PMK088.63. Flow frequencies have been requested for use in developing effluent limitations for the VPDES permit.

The USGS has operated a continuous record gage on the Pamunkey River near Hanover, VA (#01673000) since 1941. However, the river has been regulated by the Lake Anna Dam since 1972; therefore, only the flows recorded after 1972 were used to calculate the flow frequencies. The gage is located at Normans Bridge (Route 614), which is approximately 6 miles downstream from the discharge. The flow frequencies for the discharge point were determined by drainage area proportions and are presented below.

Pamunkey River near Hanover, VA (#01673000)
Drainage Area: 1,081 mi^2
Statistical period: 1972-2003
High Flow Months: December – May

1Q30 = 34 cfs	High Flow 1Q10 = 117 cfs
1Q10 = 46 cfs	High Flow 7Q10 = 134 cfs
7Q10 = 52 cfs	High Flow 30Q10 = 200 cfs
30Q10 = 59 cfs	HM = 285 cfs
30Q5 = 75 cfs	

Pamunkey River at discharge point:
Drainage Area = 1,073 mi^2

1Q30 = 34 cfs (22 MGD)	High Flow 1Q10 = 116 cfs (75 MGD)
1Q10 = 46 cfs (30 MGD)	High Flow 7Q10 = 133 cfs (86 MGD)
7Q10 = 52 cfs (33 MGD)	High Flow 30Q10 = 199 cfs (128 MGD)
30Q10 = 59 cfs (38 MGD)	HM = 283 cfs (183 MGD)
30Q5 = 74 cfs (48 MGD)	

This analysis does not address any withdrawals, discharges, or springs lying between the gauge and the discharge point.

During the 305(b)/303(d) Integrated Water Quality Assessment, the Pamunkey River was considered a Category 5A water ("A Water Quality Standard is not attained. The water is impaired or threatened for one or more designated uses by a pollutant(s) and requires a TMDL (303d list)." The applicable fact sheet is attached. The water was assessed as not supporting of the Recreation Use based on E. coli exceedances. The Aquatic Life, Fish Consumption, and Wildlife Uses were fully supporting.

The STP was addressed in the Chesapeake Bay TMDL, which was approved by the EPA on 12/29/2010. The TMDL allocates loads for total nitrogen, total phosphorus, and total suspended solids to protect the dissolved oxygen and submerged aquatic vegetation acreage criteria in the Chesapeake Bay and its tidal tributaries. The discharge is included in the aggregated loads for non-significant wastewater dischargers in the tidal freshwater Pamunkey River estuary (PMKTF). The nutrient allocations are administered through the Watershed Nutrient General Permit; the TSS allocations are considered aggregated and facilities with technology-based TSS limits are considered to be in conformance with the TMDL.

In addition, the discharge is being addressed in the draft Pamunkey River Watershed TMDL. The draft TMDL proposes an E. coli wasteload allocation of 1.39E+11 cfu/year.

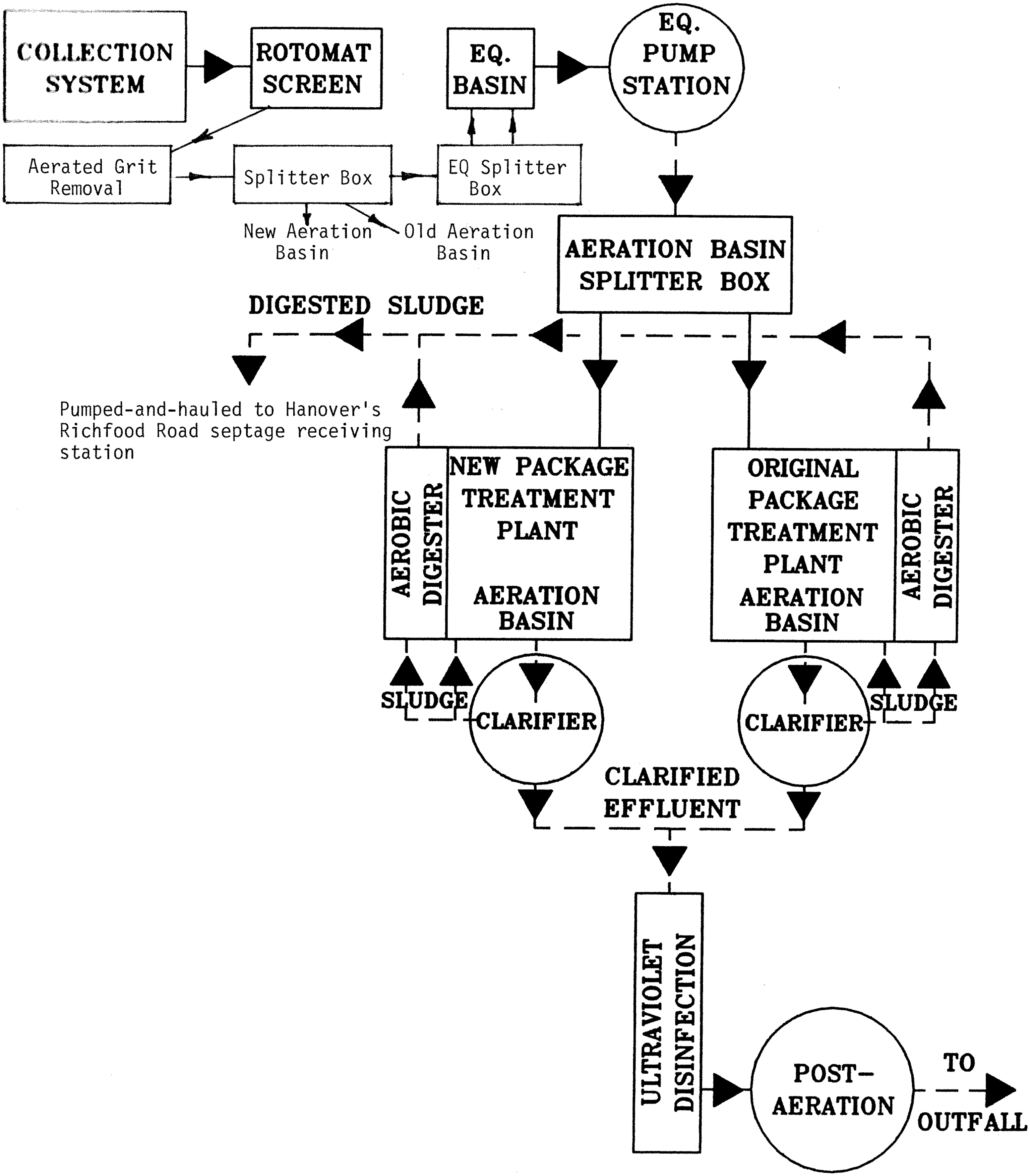
Water quality monitoring data is attached. Field data was collected at station 8-PMK088.11, which is located just downstream of the outfall at the Route 301 bridge. Hardness data from station 8-PMK082.34 was used; the station is located at the Route 614 bridge and is co-located with the stream gage.

The Pamunkey River has historically been considered a Tier 2 water and the DEQ's antidegradation policy has been applied to all modeling for the facility. Data from the above stations is acceptable and the Tier 2 status should be continued.

If you have any questions concerning this analysis, please let me know.

Attachment B

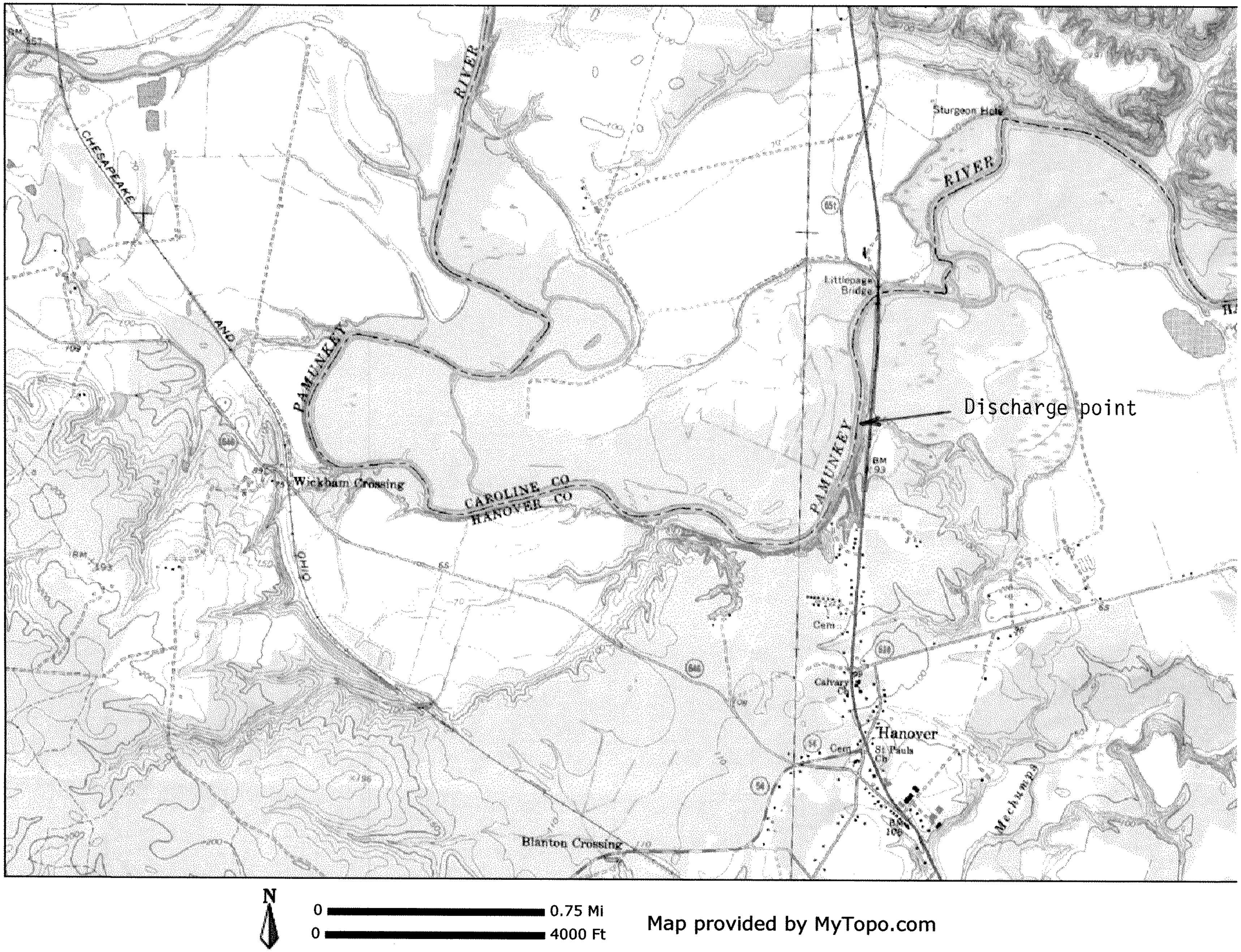
Facility Diagram



WASTEWATER TREATMENT PLANT
FLOW SCHEMATIC

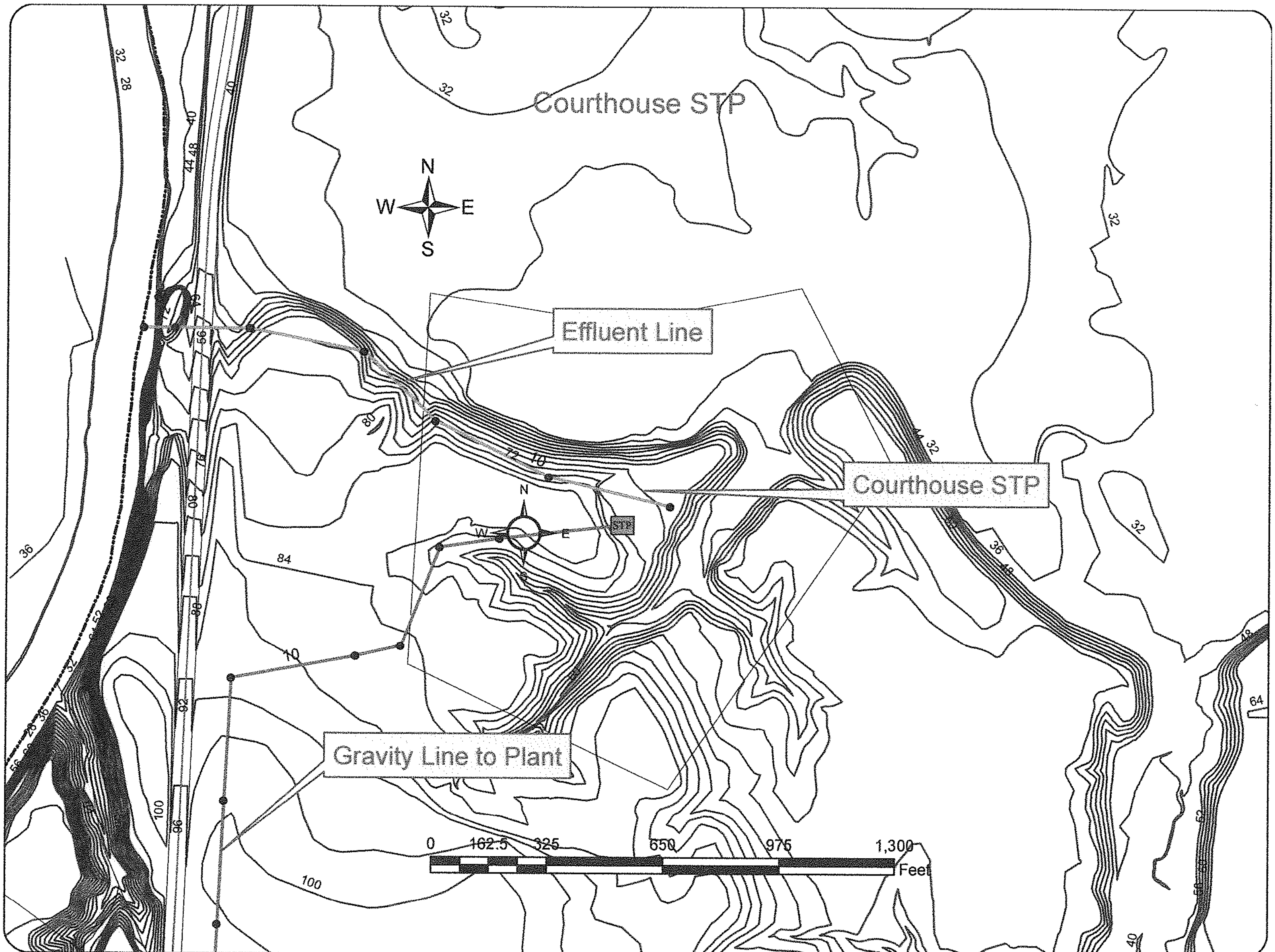
Attachment C

Location Map



Map provided by MyTopo.com

Hanover topo (149D)



VA0062154 - Hanover Courthouse STP Attachment 1

Attachment D

Ambient Data

Station ID	Collection Date	Depth Desc	Depth	Temp Celcius	Field Ph	Do Probe	Do Winkler	Specific Conductance
8-PMK088.11	6/3/1969	S	1	26.67	7.5		7.2	
8-PMK088.11	9/2/1969	S	1	22.22	6.5		6.6	
8-PMK088.11	2/4/1970	S	1	2.22	6.7		12	
8-PMK088.11	3/19/1970	S	1	5.56	6.8		12.69	
8-PMK088.11	4/14/1970	S	1	12.22	6.8		9.9	
8-PMK088.11	5/7/1970	S	1	15.56	8		8.9	
8-PMK088.11	5/31/1970	S	1	19.44	7.5		8.2	
8-PMK088.11	7/11/1970	S	1		7.5		7	
8-PMK088.11	9/2/1970	S	1	22.22	7		8.4	
8-PMK088.11	10/29/1970	S	1	13.89	6.7		9.4	
8-PMK088.11	11/22/1970	S	1	7.22	6.5		9	
8-PMK088.11	11/22/1970	S	1	7.22	6.5		9	
8-PMK088.11	12/10/1970	S	1	4.44	7		13.79	
8-PMK088.11	1/13/1971	S	1	3.33	6.8		11.79	
8-PMK088.11	2/10/1971	S	1	0	6		12.79	
8-PMK088.11	3/11/1971	S	1	7.78	6.7		12.19	
8-PMK088.11	4/21/1971	S	1	17.78	6.8		9.2	
8-PMK088.11	5/6/1971	S	1	17.22	6.3		9.4	
8-PMK088.11	6/1/1971	S	1	17.78	7.2		8.8	
8-PMK088.11	7/11/1971	S	1	27.78	6.3		6.4	
8-PMK088.11	8/30/1971	S	1	23.33	6.2		6.4	
8-PMK088.11	9/2/1971	S	1	23.33	6.7		6.4	
8-PMK088.11	10/20/1971	S	1	15.56	6.8		10	
8-PMK088.11	11/10/1971	S	1	8.89	6.3		10.79	
8-PMK088.11	12/13/1971	S	1	7.78	6.8		11.59	
8-PMK088.11	1/3/1972	S	1	7.78	6.8		12.79	
8-PMK088.11	2/16/1972	S	1	7.78			11.59	
8-PMK088.11	3/5/1972	S	1	10.56	6.7		11.39	
8-PMK088.11	4/3/1972	S	1	9.44	6.9		11.59	
8-PMK088.11	8/18/1972	S	1	22.22	7		8	
8-PMK088.11	8/31/1972	S	1	24.44	7		7	
8-PMK088.11	10/31/1972	S	1	12.22	6.5		10	
8-PMK088.11	12/11/1972	S	1	8.89	6.9		10.59	
8-PMK088.11	1/19/1973	S	1	6.11	6.7		8.4	
8-PMK088.11	2/16/1973	S	1	2.78	6.7		12.59	
8-PMK088.11	3/26/1973	S	1	10	6.8		10.59	
8-PMK088.11	4/17/1973	S	1	13.33	6.9		11	
8-PMK088.11	5/28/1973	S	1	17.78	7		8.6	
8-PMK088.11	6/19/1973	S	1	21.67	7.1		7	
8-PMK088.11	7/30/1973	S	1	26.67	7.5		7.6	
8-PMK088.11	8/19/1973	S	1	25.56	7.1		8	
8-PMK088.11	9/17/1973	S	1	23.33	7		7.8	
8-PMK088.11	10/12/1973	S	1	18.89	6.9		7.4	
8-PMK088.11	11/14/1973	S	1	10.56	7		10.79	
8-PMK088.11	12/3/1973	S	1	5.56	6.8		10.79	
8-PMK088.11	1/17/1974	S	1	6.11	7		11.39	
8-PMK088.11	2/20/1974	S	1	5.56	6.9		11.69	
8-PMK088.11	3/4/1974	S	1	10	7.2		12	
8-PMK088.11	4/16/1974	S	1	15.56	6.6		11.39	
8-PMK088.11	5/13/1974	S	1	16.67	7		8.8	
8-PMK088.11	6/12/1974	S	1	23.33	7		7.4	
8-PMK088.11	7/15/1974	S	1	26.67	7		7.6	
8-PMK088.11	8/11/1974	S	1	23.33	7.3		7.8	
8-PMK088.11	9/20/1974	S	1	22.22	7		9	
8-PMK088.11	10/8/1974	S	1	12.22	7.3		9.6	
8-PMK088.11	12/13/1974	S	1	7.22	6.3		11.19	

Station ID	Collection Date	Depth Desc	Depth	Temp Celcius	Field Ph	Do Probe	Do Winkler	Specific Conductance
8-PMK088.11	2/10/1975	S	1	3.89	7		13.89	
8-PMK088.11	3/20/1975	S	1	7.78	7.1		10	
8-PMK088.11	4/2/1975	S	1	13.33	7		9.9	
8-PMK088.11	5/6/1975	S	1	17.22	7		9	
8-PMK088.11	6/5/1975	S	1	22.22	7		7.6	
8-PMK088.11	7/15/1975	S	1	22.22	6.5		7.2	
8-PMK088.11	7/30/1975	S	1	25.56	7		6.6	
8-PMK088.11	8/28/1975	S	1	26.67	7		7.4	
8-PMK088.11	9/9/1975	S	1	23.33	7		7.8	
8-PMK088.11	10/17/1975	S	1	17.78	7.5		7.8	
8-PMK088.11	11/13/1975	S	1	14.44	6.7		9	
8-PMK088.11	12/1/1975	S	1	9.44	7		10.69	
8-PMK088.11	5/10/1976	S	1	17.78	7.6		9	
8-PMK088.11	6/2/1976	S	1	17.22	7.5		7.5	
8-PMK088.11	7/6/1976	S	1		7.5		8	
8-PMK088.11	8/18/1976	S	1		7.3		7.6	
8-PMK088.11	10/11/1976	S	1	16.11	7		8	
8-PMK088.11	2/28/1977	S	1	10	7.5		11.19	
8-PMK088.11	4/6/1977	S	1	12	7.5		9.5	
8-PMK088.11	5/12/1977	S	1	16	7.5		6.8	
8-PMK088.11	6/8/1977	S	1	21	7.8		9.1	
8-PMK088.11	8/17/1977	S	1	2.9	7.3		6.8	
8-PMK088.11	11/15/1977	S	1	8	7.1		10.5	
8-PMK088.11	12/14/1977	S	1	0.9	7.4		12	
8-PMK088.11	1/10/1978	S	1	0.8	7		11.79	
8-PMK088.11	3/6/1978	S	1	8	7.2		11.39	
8-PMK088.11	4/13/1978	S	1	17	9		9.4	
8-PMK088.11	6/6/1978	S	1	22	7		7.8	
8-PMK088.11	7/26/1978	S	1	27.5	7		6.6	
8-PMK088.11	8/7/1978	S	1	27	7		7	
8-PMK088.11	11/20/1978	S	1	10.5	7		10.4	
8-PMK088.11	12/13/1978	S	1	5	7.2		12	
8-PMK088.11	1/8/1979	S	1	5.5	7.3		11.6	
8-PMK088.11	3/22/1979	S	1	12	6.8		10.4	
8-PMK088.11	4/24/1979	S	1	16	7.5		9.2	
8-PMK088.11	6/14/1979	S	1	20	7		8.2	
8-PMK088.11	8/8/1979	S	0.3	28.5	7		6.2	600
8-PMK088.11	9/20/1979	S	0.3	18	7		8.4	78
8-PMK088.11	10/16/1979	S	0.3	12	7		9.8	55
8-PMK088.11	11/14/1979	S	0.3	9	6.9		9.6	80
8-PMK088.11	7/10/1980	S	0.3	26.5	7		6.8	99
8-PMK088.11	8/4/1980	S	0.3	30	7.1		6.4	132
8-PMK088.11	9/8/1980	S	0.3	26	7.5		7.2	
8-PMK088.11	10/14/1980	S	0.3	14	6.8		9.3	145
8-PMK088.11	1/5/2010	S	0.3	1.7	5.7	13.6		84
8-PMK088.11	2/4/2010	S	0.3	3.5	6.1	12.3		126
8-PMK088.11	3/1/2010	S	0.3	6.7	6.1	9.9		69
8-PMK088.11	4/15/2010	S	0.3	14.7	6.8	9		84
8-PMK088.11	5/5/2010	S	0.3	21.7	7	7.2		124
8-PMK088.11	6/1/2010	S	0.3	25.4	7	6.7		86
8-PMK088.11	7/1/2010	S	0.3	25.2	7.2	6.9		264
8-PMK088.11	8/2/2010	S	0.3	25.2	6.9	7		446
8-PMK088.11	9/1/2010	S	0.3	26.1	7.3	6.7		376
8-PMK088.11	10/4/2010	S	0.3	16.7	6.6	8.1		146
8-PMK088.11	11/1/2010	S	0.3	12.6	6.5	9.2		159
8-PMK088.11	12/1/2010	S	0.3	12	6.5	9.5		167

Station ID	Collection Date	Depth Desc	Depth	Temp Celcius	Field Ph	Do Probe	Do Winkler	Specific Conductance
8-PMK088.11	1/10/2011	S	0.3	2.2	6.3	13.3		153
8-PMK088.11	2/2/2011	S	0.3	6.4	6.5	13.8		134
8-PMK088.11	3/24/2011	S	0.3	14.4	6.6	9.4		94
8-PMK088.11	4/13/2011	S	0.3	17.2	6.9	8.2		101
8-PMK088.11	5/31/2011	S	0.3	24.9	7.1	6.7		139
8-PMK088.11	6/22/2011	S	0.3	23.5	7.3	7		95
8-PMK088.11	7/18/2011	S	0.3	25.2	7.3	6.9		268
8-PMK088.11	8/2/2011	S	0.3	26.7	7.5	6.3		332
8-PMK088.11	9/12/2011	S	0.3	23.3	6.8	6.2		96
8-PMK088.11	10/5/2011	S	0.3	15.9	6.6	9.6		119
8-PMK088.11	11/29/2011	S	0.3	12.6	6.7	9.2		113
8-PMK088.11	12/21/2011	S	0.3	9.59	6.74	11.02		87
8-PMK088.11	1/7/2014	S	0.3	4.18	6.79	13.43		83
8-PMK088.11	2/10/2014	S	0.3	3.89	7.05	12.9		93
8-PMK088.11	3/5/2014	S	0.3	4.53	7.54	12.52		81
8-PMK088.11	4/7/2014	S	0.3	13.53	7.28	9.35		120
8-PMK088.11	5/1/2014	S	0.3	14.26	6.5	7.94		45
90th Percentile				**25.8**	**7.5**			
10th Percentile				**4.3**	**6.5**			

Station ID	Collection Date Time	Depth Desc	Depth	Container Id Desc	HARDNESS, TOTAL (MG/L AS CACO3)
8-PMK082.34	11/21/1988	S	0.3	R	26
8-PMK082.34	02/13/1989 10:45	S	0.3	R	28
8-PMK082.34	03/13/1989 11:00	S	0.3	R	20
8-PMK082.34	04/11/1989 11:35	S	0.3	R	20
8-PMK082.34	05/04/1989 11:20	S	0.3	R	20
8-PMK082.34	07/10/1989 12:20	S	0.3	R	28
8-PMK082.34	08/31/1989 11:30	S	0.3	R	28
8-PMK082.34	10/04/1989 10:20	S	0.3	R	20
8-PMK082.34	12/06/1989 10:10	S	0.3	R	20
8-PMK082.34	01/22/1990 10:10	S	0.3	R	22
8-PMK082.34	02/14/1990 09:20	S	0.3	R	22
8-PMK082.34	03/14/1990 09:10	S	0.3	R	23
8-PMK082.34	04/17/1990 10:45	S	0.3	R	36
8-PMK082.34	05/10/1990 09:10	S	0.3	R	24
8-PMK082.34	06/13/1990 10:05	S	0.3	R	25
8-PMK082.34	07/11/1990 11:20	S	0.3	R	36
8-PMK082.34	08/08/1990 14:15	B	1	R	42
8-PMK082.34	09/10/1990 10:50	S	0.3	R	44
8-PMK082.34	10/10/1990 09:50	S	0.3	R	54
8-PMK082.34	11/19/1990 09:45	S	0.3	R	35
8-PMK082.34	12/06/1990 09:50	S	0.3	R	30
8-PMK082.34	01/03/1991 09:05	S	0.3	R	28
8-PMK082.34	02/19/1991 10:05	S	0.3	R	31
8-PMK082.34	03/05/1991 09:15	S	0.3	R	31
8-PMK082.34	04/02/1991 09:20	S	0.3	R	18
8-PMK082.34	05/01/1991 10:05	S	0.3	R	26
8-PMK082.34	06/12/1991 10:40	S	0.3	R	80
8-PMK082.34	07/15/1991 09:20	S	0.3	R	18
8-PMK082.34	10/09/1991 10:25	S	0.3	R	74
8-PMK082.34	11/12/1991 10:45	S	0.3	R	82
8-PMK082.34	12/12/1991 10:55	S	0.3	R	30
8-PMK082.34	01/08/1992 09:25	S	0.3	R	24
8-PMK082.34	02/05/1992 09:45	S	0.3	R	28
8-PMK082.34	03/09/1992 09:35	S	0.3	R	28
8-PMK082.34	04/06/1992 10:05	S	0.3	R	24
8-PMK082.34	05/05/1992 10:05	S	0.3	R	33
8-PMK082.34	06/02/1992 09:20	S	0.3	R	26
8-PMK082.34	07/01/1992 09:25	S	0.3	R	31
8-PMK082.34	07/07/1992 09:25	S	0.3	R	45
8-PMK082.34	08/12/1992 09:37	S	0.3	R	46
8-PMK082.34	09/14/1992 09:35	S	0.3	R	49
8-PMK082.34	10/14/1992 09:30	S	0.3	R	39
8-PMK082.34	11/16/1992 09:30	S	0.3	R	34
8-PMK082.34	01/13/1993 09:45	S	0.3	R	18
8-PMK082.34	02/10/1993 09:30	S	0.3	R	25
8-PMK082.34	04/13/1993 09:20	S	0.3	R	32
8-PMK082.34	06/08/1993 09:55	S	0.3	R	45
8-PMK082.34	07/08/1993 09:50	S	0.3	R	64
8-PMK082.34	08/05/1993 11:15	S	0.3	R	38
8-PMK082.34	11/23/1993 09:25	S	0.3	R	40
8-PMK082.34	12/06/1993 17:10	S	0.3	R	20

8-PMK082.34	01/12/1994 09:20	S	1	R	22
8-PMK082.34	01/13/1994 07:30	S	1	R	54
8-PMK082.34	02/15/1994 08:15	S	1	R	18
8-PMK082.34	03/30/1994 09:10	S	1	R	14
8-PMK082.34	04/26/1994 09:00	S	1	R	23
8-PMK082.34	05/24/1994 09:05	S	1	R	43
8-PMK082.34	06/23/1994 09:00	S	1	R	32
8-PMK082.34	09/26/1994 09:20	S	1	R	22
8-PMK082.34	10/20/1994 09:30	S	1	R	30
8-PMK082.34	11/29/1994 09:00	S	1	R	29
8-PMK082.34	12/13/1994 08:45	S	1	R	22
8-PMK082.34	02/13/1995 09:10	S	1	R	24
8-PMK082.34	03/05/1995 09:30	S	1	R	22
8-PMK082.34	03/07/1995 09:30	S	1	R	22
8-PMK082.34	05/09/1995 09:15	S	1	R	23
8-PMK082.34	06/22/1995 09:45	S	1	R	28
8-PMK082.34	07/06/1995 09:35	S	1	R	30
8-PMK082.34	08/15/1995 09:00	S	1	R	33
8-PMK082.34	09/05/1995 09:45	S	1	R	48
8-PMK082.34	10/10/1995 09:30	S	1	R	40
8-PMK082.34	11/08/1995 09:30	S	1	R	24
8-PMK082.34	12/04/1995 09:30	S	1	R	24
8-PMK082.34	01/16/1996 09:20	S	1	R	23
8-PMK082.34	02/12/1996 09:30	S	1	R	20
8-PMK082.34	04/15/1996 10:15	S	1	R	32
8-PMK082.34	05/21/1996 09:30	S	1	R	22
8-PMK082.34	06/04/1996 09:30	S	1	R	28
8-PMK082.34	07/09/1996 09:30	S	1	R	36
8-PMK082.34	09/10/1996 09:00	S	1	R	19
8-PMK082.34	10/15/1996 10:00	S	1	R	22
8-PMK082.34	11/05/1996 09:10	S	1	R	28
8-PMK082.34	12/03/1996 08:45	S	1	R	19
8-PMK082.34	01/07/1997 09:30	S	1	R	22
8-PMK082.34	02/04/1997 09:30	S	1	R	16.8
8-PMK082.34	03/04/1997 09:45	S	1	R	21
8-PMK082.34	04/08/1997 09:30	S	1	R	22.2
8-PMK082.34	05/06/1997 09:15	S	1	R	25.7
8-PMK082.34	06/10/1997 09:15	S	1	R	30
8-PMK082.34	08/11/1997 09:15	S	1	R	34.8
8-PMK082.34	09/09/1997 09:20	S	1	R	41
8-PMK082.34	10/07/1997 09:30	S	1	R	37.9
8-PMK082.34	11/05/1997 10:15	S	1	R	19.3
8-PMK082.34	12/04/1997 16:30	S	1	R	23.4
8-PMK082.34	01/05/1998 13:44	S	1	R	19.9
8-PMK082.34	02/02/1998 09:55	S	1	R	19.5
8-PMK082.34	03/02/1998 12:30	S	1	R	15.5
8-PMK082.34	04/06/1998 10:30	S	1	R	20
8-PMK082.34	05/11/1998 13:03	S	1	R	20.4
8-PMK082.34	06/09/1998 10:01	S	1	R	26.2
8-PMK082.34	07/07/1998 12:01	S	1	R	31.1
8-PMK082.34	08/04/1998 11:49	S	1	R	41.8
8-PMK082.34	09/08/1998 11:33	S	1	R	45.5
8-PMK082.34	10/06/1998 11:59	S	1	R	43.6
8-PMK082.34	11/09/1998 12:15	S	1	R	32
8-PMK082.34	12/08/1998 12:00	S	1	R	41

8-PMK082.34	02/09/1999 12:33	S	1	R	52
8-PMK082.34	03/11/1999 14:01	S	1	R	34
8-PMK082.34	04/06/1999 13:11	S	1	R	42
8-PMK082.34	05/03/1999 13:01	S	1	R	60
8-PMK082.34	06/08/1999 13:03	S	1	R	56.4
8-PMK082.34	07/06/1999 11:01	S	1	R	55.3
8-PMK082.34	08/03/1999 12:22	S	1	R	61.5
8-PMK082.34	09/07/1999 09:01	S	1	R	20.9
8-PMK082.34	10/05/1999 11:01	S	1	R	41.2
8-PMK082.34	11/02/1999 10:44	S	1	R	43.9
8-PMK082.34	12/08/1999 11:01	S	1	R	38.6
8-PMK082.34	01/12/2000 10:20	S	1	R	24.3
8-PMK082.34	02/08/2000 12:00	S	1	R	27.5
8-PMK082.34	03/07/2000 11:02	S	1	R	20
8-PMK082.34	04/13/2000 11:30	S	1	R	20
8-PMK082.34	05/09/2000 12:30	S	1	R	28
8-PMK082.34	06/06/2000 11:38	S	1	R	30
8-PMK082.34	07/07/2000 13:30	S	1	R	29.1
8-PMK082.34	08/08/2000 11:59	S	1	R	34
8-PMK082.34	09/14/2000 11:33	S	1	R	41.5
8-PMK082.34	10/10/2000 11:59	S	1	R	51.5
8-PMK082.34	11/07/2000 10:44	S	1	R	51
8-PMK082.34	12/05/2000 11:11	S	1	R	35.3
8-PMK082.34	01/09/2001 11:11	S	1	R	35.6
8-PMK082.34	02/06/2001 12:12	S	1	R	35.6
8-PMK082.34	03/13/2001 11:11	S	1	R	15.3
8-PMK082.34	04/10/2001 09:44	S	1	R	25.4
8-PMK082.34	05/08/2001 11:01	S	1	R	30
8-PMK082.34	06/05/2001 10:33	S	1	R	27.3
8-PMK082.34	07/10/2001 11:14	S	1	R	29
8-PMK082.34	08/07/2001 12:15	S	1	S1	51
8-PMK082.34	09/04/2001 10:55	S	1	R	51.2
8-PMK082.34	10/02/2001 11:11	S	1	R	61.1
8-PMK082.34	11/05/2001 11:11	S	1	R	29.7
8-PMK082.34	12/04/2001 12:12	S	1	R	37.2
8-PMK082.34	01/14/2002 11:33	S	1	R	20.8
8-PMK082.34	02/12/2002 12:50	S	1	R	40.6
8-PMK082.34	03/12/2002 11:11	S	1	R	46.5
8-PMK082.34	04/09/2002 11:33	S	1	R	41.1
8-PMK082.34	05/14/2002 11:02	S	1	R	32.2
8-PMK082.34	06/11/2002 10:58	S	1	R	63.1
8-PMK082.34	07/09/2002 11:11	S	1	R	79.4
8-PMK082.34	08/06/2002 12:22	S	1	R	54.3
8-PMK082.34	09/16/2002 12:05	S	1	R	58.6
8-PMK082.34	10/08/2002 11:59	S	1	R	69.1
8-PMK082.34	11/05/2002 12:22	S	1	S1	75.4
8-PMK082.34	12/03/2002 11:01	S	1	R	29.3
8-PMK082.34	01/07/2003 11:44	S	1	R	26.6
8-PMK082.34	02/11/2003 12:12	S	1	R	29.9
Average					**33.7**

Attachment E

2012 Fact Sheets for 303(d) Waters

2012 Fact Sheets for 303(d) Waters

RIVER BASIN: York River Basin

HYDROLOGIC UNIT: 02080106

STREAM NAME: **Pamunkey River**

TMDL ID: **F12R-08-BAC**

2012 IMPAIRED AREA ID: VAP-F12R-08

ASSESSMENT CATEGORY: 5A

TMDL DUE DATE: 2020

IMPAIRED SIZE: 12.26 - Miles

Watershed: VAP-F12R

INITIAL LISTING: 2008

UPSTREAM LIMIT: Confluence of South Anna and North Anna Rivers

DOWNSTREAM LIMIT: Mechumps Creek

The Pamunkey River from its start at the confluence of the South Anna and North Anna Rivers downstream to the confluence with Mechumps Creek.

CLEAN WATER ACT GOAL AND USE SUPPORT:

Recreation Use - Not Supporting

IMPAIRMENT: E. coli

During the 2008 cycle, the segment was assessed as not supporting of the Recreation Use based on E. coli violations at the Route 614 bridge (8-PMK082.34). During the 2012 cycle, the violation rate was 4/25. Sampling at 8-PMK088.11 was acceptable (1/12).

IMPAIRMENT SOURCE: Unknown

The source of the bacteria is considered unknown.

RECOMMENDATION: Problem Characterization

Attachment F

Inspection and Site Visit Reports

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4949-A Cox Rd Glen Allen, VA 23060 (804) 527-5046

SUBJECT: Site Visit

TO: File

FROM: Laura Galli, PRO

DATE: August 26, 2014

COPIES: File

Facility Name: Hanover Courthouse STP
Permit Number: VA0062154

On August 26, 2014, I performed a site visit at the Hanover Courthouse Sewage Treatment Plant, which is located at 13500 Courthouse Road, Hanover, VA 23063. The site visit was coordinated with Barbara Mitchell and David Van Gelder, both of Hanover County Department of Public Utilities; both accompanied me during the tour of the facility.

The appearance of the grounds at the facility indicated that there is consistent maintenance, and it appeared clean and organized. The facility's lawn and other vegetation around the site looked well groomed.

The Hanover Courthouse STP has a design capacity of 80,000 GPD; the facility is an aeration activated sludge plant that includes a sewage pumping station, rotomat screening, grit channel, flow equalization basins, clarifiers, UV channel, post aeration tank, and drying beds (last used in 1995). A backup generator is available in the event of loss of electrical power.

As wastewater enters the treatment works, it is first screened through the rotomat and subsequently through the aerated grit channel to remove grit and larger debris. The wastewater then flows to a splitter box that has the function of distributing the flow to two equalization basins. Wastewater is pumped from each basin to the flow control box, where it flows to the splitter box prior to the aeration basin. Very little foam was observed in the aeration basin; no dead spots or excessive aeration were observed. The aeration basin splitter box is connected t a second, "old" aeration basin that is not currently used as the actual flow is well below the design flow (approximately 45,000 MGD); this basin currently contains very little wastewater and is covered in duckweeds. The aeration basin has an aerobic digester for sludge stabilization; the sludge is allowed to settle and is then decanted to the head of the plant via a submersible pump, and is then pumped and hauled to Hanover's Richfood Road septage receiving station.

The secondary clarifier immediately follows the aeration basin. There appeared to be good settling characteristics in the clarifier chamber. No floatable solids in the clarifier were noted.

The wastewater then enters the ultraviolet disinfection channel, which consists of 2-module banks of lights. Each module is alternatively cleaned on a weekly schedule, and each light is replaced annually.

Following disinfection, the wastewater enters a post aeration tank to further reduce the DO. The aeration provided looks appropriate.

The facility discharges directly to the Pamunkey River; the outfall is located approximately 0.5 miles north west of the facility, connected by an underground pipe. The outfall on the river was not observed during the site visit.

Generally, the plant looks in good working conditions with no strong or unusual odors at any location during the site visit.

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
PIEDMONT REGIONAL OFFICE
4949-A Cox Road, Glen Allen, Virginia 23060
(804) 527-5020 Fax (804) 527-5106
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Doug Domenech
Secretary of Natural Resources

David K. Paylor
Director

Michael P. Murphy
Regional Director

December 28, 2010

Mr. David F. Van Gelder,
Chief of Operations & Maintenance
Hanover County
PO Box 470
Hanover, VA 23069-0470

Re: Wastewater Facility and Laboratory Inspections; VPDES Permit No. VA0062154 – Hanover Courthouse WWTP, Hanover Co., VA

Dear Mr. Van Gelder,

Enclosed are the reports for the subject inspections performed on December 21, 2010. A response to the reports is not necessary as no issues resulted from the inspections.

If you have questions regarding the reports, please contact me at (804) 527-5055.

Sincerely,

Mike Dare

Mike Dare
Water Inspector

Enclosure
CC: DEQ – File
B. Mitchell

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Wastewater Facility Inspection Report

Revised 08/2001

Facility Name:	Hanover Courthouse WWTP	**Facility No.:**	VA0062154
~~City~~/County:	Hanover	**Inspection Agency:**	DEQ-PRO
Inspection Date:	December 21, 2010	**Date Form Completed:**	December 28, 2010
Inspector:	Mike Dare M Dare 12-28-10	**Time Spent:**	15 hrs. w/ travel & report
Reviewed By:	CKS 12/28/10 KW 12/28/10	**Unannounced Insp.?**	No
		FY-Scheduled Insp.?	Yes
Present at Inspection:	Barbara Mitchell		

TYPE OF FACILITY:

Domestic		Industrial	
[ ] Federal	[ ] Major	[ ] Major	[ ] Primary
[x] Non-Federal	[X] Minor	[ ] Minor	[ ] Secondary

Population Served: ***Varies daily***

Number of Connections: ***The courthouse complex, jail, fire station, post office and several local businesses, restaurants and homes***

TYPE OF INSPECTION:

[x] Routine — Date of last inspection: ***June 28, 2006***

[ ] Compliance — Agency: ***DEQ/PRO***

[ ] Reinspection

EFFLUENT MONITORING:

October 2010 average: BOD_5: 3.5 mg/L TSS: 3.5 mg/L Flow: 0.063 MGD

CHANGES AND/OR CONSTRUCTION

DATA VERIFIED IN PREFACE	[ ] Updated	[x] No changes	
Has there been any new construction?	[ ] Yes*	[x] No	
If yes, were plans and specifications approved?	[ ] Yes	[ ] No*	[x] N/A
DEQ approval date:	N/A		

(A) PLANT OPERATION AND MAINTENANCE

1. Class and number of licensed operators: ***Class I – 3; Class II – 1; Class IV – 1; Operator in Training - 1***
2. Hours per day plant is staffed: ***3+ hours/day***
3. Describe adequacy of staffing: [x] Good [ ] Average [ ] Poor*
4. Does the plant have an established program for training personnel? [x] Yes [ ] No
5. Describe the adequacy of the training program: [x] Good [ ] Average [ ] Poor*
6. Are preventive maintenance tasks scheduled? [x] Yes [ ] No*
7. Describe the adequacy of maintenance: [x] Good [ ] Average [ ] Poor*
8. Does the plant experience any organic/hydraulic overloading? [ ] Yes* [x] No

   If yes, identify cause and impact on plant N/A

9. Any bypassing since last inspection? [ ] Yes* [x] No
10. Is the on-site electric generator operational? [x] Yes [ ] No* [ ] N/A
11. Is the STP alarm system operational? [x] Yes [ ] No * [ ] N/A
12. How often is the standby generator exercised? [x] Weekly [ ] Monthly [ ] Other:

    Power Transfer Switch? [x] Weekly [ ] Monthly [ ] Other:

    Alarm System? [x] Weekly [ ] Monthly [ ] Other:
13. When were the cross connection control devices last tested on the potable water service? ***9/16/10***
14. Is sludge disposed in accordance with the approved sludge disposal plan? [x] Yes [ ] No* [ ] N/A
15. Is septage received by the facility? [ ] Yes [x] No

    Is septage loading controlled? [ ] Yes [ ] No * [x] N/A

    Are records maintained? [ ] Yes [ ] No* [x] N/A
16. Overall appearance of facility: [x] Good [ ] Average [ ] Poor*

Comments: #1 & 3) All the operators at the Doswell WWTP are trained to operate the Hanover Courthouse WWTP.

#4) The training program includes the SAC course, VA Tech Short Course, DEQ courses, OJT.

#11 & 12) Units equipped with alarms include the Rotamat, FEB, Blowers, Clarifier Drive, UV system, Plant Drain Sump and Generator. Alarm system has local signals and auto dialer.

#14) Thickened liquid sludge is pumped and hauled to the Richfood Road Septage Receiving Station on the Henrico County WWTP Collection System.

(B) PLANT RECORDS

1. Which of the following records does the plant maintain?			
Operational Logs for each unit process	[x] Yes	[ ] No*	[ ] N/A
Instrument maintenance and calibration	[x] Yes	[ ] No*	[ ] N/A
Mechanical equipment maintenance	[x] Yes	[ ] No*	[ ] N/A
Industrial waste contribution **(Municipal Facilities)**	[ ] Yes	[ ] No*	[x] N/A
2. What does the operational log contain?			
Visual Observations	[x] Yes	[ ] No	[ ] N/A
Flow Measurement	[x] Yes	[ ] No	[ ] N/A
Laboratory Results	[x] Yes	[ ] No	[ ] N/A
Process Adjustments	[x] Yes	[ ] No*	[ ] N/A
Control Calculations	[ ] Yes	[x] No	[ ] N/A
Other:			
3. What do the mechanical equipment records contain:			
As built plans and specs?	[x] Yes	[ ] No*	[ ] N/A
Spare parts inventory?	[x] Yes	[ ] No*	[ ] N/A
Manufacturers instructions?	[x] Yes	[ ] No*	[ ] N/A
Equipment/parts suppliers?	[x] Yes	[ ] No*	[ ] N/A
Lubrication schedules?	[x] Yes	[ ] No*	[ ] N/A
Other:			
Comments:	None		
4. What do the industrial waste contribution records contain:	***(Applicable to municipal facilities only)***		
Waste characteristics?	[ ] Yes	[ ] No*	[x] N/A
Locations and discharge types?	[ ] Yes	[ ] No*	[x] N/A
Impact on plant?	[ ] Yes	[ ] No*	[x] N/A
Other:	N/A		
Comments:	None		
5. Are the following records maintained at the plant			
Equipment maintenance records	[x] Yes	[ ] No*	[ ] N/A
Operational Log	[x] Yes	[ ] No*	[ ] N/A
Industrial contributor records	[ ] Yes	[ ] No*	[x] N/A
Instrumentation records	[x] Yes	[ ] No*	[ ] N/A
Sampling and testing records	[x] Yes	[ ] No*	[ ] N/A
6. Are records maintained at a different location?	[x*] Yes	[ ] No	
Where are the records maintained?	****Previous 12 months of records maintained on site, all others are available at the Doswell WWTP.***		
7. Were the records reviewed during the inspection?	[x] Yes	[ ] No	
8. Are the records adequate and the O & M Manual current?	[x] Yes	[ ] No*	[ ] N/A
O&M Manual date written: ***Submitted 10/10/97***			
Date DEQ approved O&M: ***11/13/97 – VDH***			
9. Are the records maintained for required 3-year period?	[x] Yes	[ ] No*	

Comments: #1 - An operational log is maintained; in addition, a separate notebook is maintained for UV system maintenance. In general the logs include notes for various treatment units, observations, equipment adjustment.

#2 - Lab records are separate from the operational log.

(C) SAMPLING

1. Are sampling locations capable of providing representative samples? [x] Yes [ ] No* [ ] N/A
2. Do sample types correspond to those required by the permit? [x] Yes [ ] No* [ ] N/A
3. Do sampling frequencies correspond to those required by the permit? [x] Yes [ ] No* [ ] N/A
4. Are composite samples collected in proportion to flow? [x] Yes [ ] No* [ ] N/A
5. Are composite samples refrigerated during collection? [x] Yes [ ] No* [ ] N/A
6. Does plant maintain required records of sampling? [x] Yes [ ] No* [ ] N/A
7. Does plant run operational control tests? [x] Yes [ ] No* [ ] N/A

Comments:

(D) TESTING

1. Who performs the testing? [x] Plant/ Lab
   [x] Central Lab: ***BOD by Doswell WWTP Lab; TSS and E. coli by Totopotomoy WWTP Lab***
   [x] Commercial Lab - Name: ***TKN by J. R. Reed Lab***

   If plant performs any testing, complete 2-4.

2. What method is used for chlorine analysis? ***N/A - UV Disinfection***
3. Is sufficient equipment available to perform required tests? [x] Yes [ ] No* [ ] N/A
4. Does testing equipment appear to be clean and/or operable? [x] Yes [ ] No* [ ] N/A

Comments: Please see enclosed DEQ *Laboratory Inspection Report.*

(E) FOR INDUSTRIAL FACILITIES W/ TECHNOLOGY BASED LIMITS N/A

1. Is the production process as described in the permit application? (If no, describe changes in comments)
   [ ] Yes [ ] No* [x] N/A
2. Do products and production rates correspond to the permit application? (If no, list differences in comments section)
   [ ] Yes [ ] No* [x] N/A
3. Has the State been notified of the changes and their impact on plant effluent?
   [ ] Yes [ ] No* [x] N/A

Comments: None

FOLLOW UP TO COMPLIANCE RECOMMENDATIONS FROM THE June 28, 2006 DEQ INSPECTION:

1. There were no compliance recommendations associated with the June 28, 2006 inspection.

FOLLOW UP TO GENERAL RECOMMENDATIONS FROM THE June 28, 2006 DEQ INSPECTION:

1. There were no general recommendations associated with the June 28, 2006 inspection.

INSPECTION REPORT SUMMARY

Compliance Recommendations/Request for Corrective Action:

1. There are no Compliance Recommendations at this time.

General Recommendations/Observations:

1. There are no General Recommendations at this time.

Comments:

One of two aeration basin – clarifier trains ("new plant") was in use at the time of inspection. Preceding the completion of collection system rehabilitation work in February 2006, both the "old plant" and "new plant" aeration basin – clarifier trains were required, due to I&I flow. There are two pump stations within the collection system: Pamunkey Regional Jail Pump Station and the Hanover Lift Station. Both stations are connected to the SCADA system and both have on site backup generator power. There was no evidence of a bypass having occurred at either station at the time of inspection.


Pamunkey Regional Jail Pump Station


Hanover Lift Station

Items evaluated during this inspection include (check all that apply):

[X] Yes	[ ] No		Operational Units
[ ] Yes	[x] No		O & M Manual
[X] Yes	[ ] No		Maintenance Records
[ ] Yes	[ ] No	[X] N/A	Pathogen Reduction & Vector Attraction Reduction
[X] Yes	[ ] No	[ ] N/A	Sludge Disposal Plan
[ ] Yes	[ ] No	[X] N/A	Groundwater Monitoring Plan
[ ] Yes	[ ] No	[X] N/A	Storm Water Pollution Prevention Plan
[X] Yes	[ ] No	[ ] N/A	Permit Special Conditions
[ ] Yes	[ ] No	[X] N/A	Permit Water Quality Chemical Monitoring
[X] Yes	[ ] No	[ ] N/A	Laboratory Records (see Lab Report)

UNIT PROCESS: Sewage Pumping

1. Name of station: ***Plant Drain***
2. Location (if not at STP): ***N/A***
3. Following equipment operable:

a. All pumps?	[x] Yes	[] No*	
b. Ventilation?	[] Yes	[] No*	[x] N/A
c. Control system?	[x] Yes	[] No*	[] N/A
d. Sump pump?	[] Yes	[] No*	[x] N/A
e. Seal water system?	[] Yes	[] No*	[x] N/A

4. Reliability considerations:

a. Class	[] I	[x] II	[] III
b. Alarm system operable?	[x] Yes	[] No	[] N/A
c. Alarm conditions monitored:			
1. high water level:	[x] Yes	[] No*	[] N/A
2. high liquid level in dry well:	[] Yes	[] No*	[x] N/A
3. main electric power:	[] Yes	[] No*	[x] N/A
4. auxiliary electric power:	[] Yes	[] No*	[x] N/A
5. failure of pump motors to start:	[] Yes	[] No*	[x] N/A
6. test function:	[x] Yes	[] No*	
7. other:	N/A		
d. Backup for alarm system operational?	[x] Yes	[] No*	[] N/A
e. Alarm signal reported to (identify):	***local audible & visual, with autodialer***		
f. Continuous operability provisions:			
1. Generator hook up?	[x] Yes	[] No	***On Site Generator***
2. Two sources of electricity?	[] Yes	[x] No	
3. Portable pump?	[] Yes	[x] No	
4. 1 day storage?	[] Yes	[x] No	
5. other:	***County Owned VacTruck***		

5. Does station have bypass?

Does station have bypass?	[] Yes*	[x] No	
a. Evidence of bypass use?	[] Yes*	[] No	[x] N/A
b. Can bypass be disinfected?	[] Yes	[] No*	[x] N/A
c. Can bypass be measured?	[] Yes	[] No*	[x] N/A

6. How often is station checked? ***At least daily***

7. General condition: [x] Good [] Fair [] Poor*

Comments: This pump station is equipped with one submersible pump. Process units in the plant, such as the Rotamat, grit channel, equalization basins, clarifiers, UV channel and drying beds, are equipped with drains, to allow for cleaning and maintenance. Each of the units drains to the Plant Drain wet well.

UNIT PROCESS: Screening/Comminution

1.	Number of units:	Manual: *1 (bypass)*		Mechanical: *1 Rotamat*
	Number of units in operation:	Manual: *0*		Mechanical: *1*
2.	Bypass channel provided?	[x] Yes	[ ] No	
	Bypass channel in use?	[ ] Yes	[x] No	[ ] N/A
3.	Area adequately ventilated?	[x] Yes	[ ] No*	
4.	Alarm system for equipment failure or overloads?	[x] Yes	[ ] No	[ ] N/A
	If present, is the alarm system operational?	[x] Yes	[ ] No *	[ ] N/A
5.	Proper flow-distribution between units?	[ ] Yes	[ ] No *	[x] N/A
6.	How often are units checked and cleaned?	*once daily*		
7.	Cycle of operation:	*flow activated by an ultrasonic flow monitor*		
8.	Volume of screenings removed:	*~ 1 – 5 gallons every 4 months*		
9.	General condition:	[x] Good	[ ] Fair	[ ] Poor*

Comments: The Rotamat at the Pamunkey Jail P.S. greatly reduces the amount of solids received at the plant.

UNIT PROCESS: Grit Removal

1.	Number of units:	*1*		
	Number of units in operation:	*1*		
2.	Unit adequately ventilated?	[x] Yes	[ ] No *	
3.	Operation of grit collection equipment:	[x] Manual	[ ] Time clock	[ ] Continuous duty
4.	Proper flow-distribution between units?	[ ] Yes	[ ] No *	[x] N/A
5.	Daily volume of grit removed:	*Not measured – very minimal*		
6.	All equipment operable?	[x] Yes	[ ] No *	
7.	General condition:	[x] Good	[ ] Fair	[ ] Poor*

Comments: This is an aerated grit channel. The air lift grit removal system is run daily. The removed grit is allowed to air dry, and then is disposed of with the screenings from the Rotamat.

UNIT PROCESS: Flow Equalization

1. Type of unit: [x] In-line [ ] Side-line [ ] Spill Pond
   Number of cells: __*2*__
   Number of cells in operation: __*2*__

2. What unit process does it precede? ***Aeration Basins***

3. Is volume adequate? [x] Yes [ ] No

4. Type of mixing: [ ] None [x] Diffused air [ ] Fixed Mechanical [ ] Floating mechanical

5. Condition of mixing equipment: [x] Good [ ] Average [ ] Poor*

6. How drawn off?
   a. Pumped from: [ ] Surface [x] Sub-surface [ ] Adjustable [ ] N/A
   b. Weir: [ ] Surface [ ] Sub-surface [x] N/A

7. What is the condition of the containment structure? [x] Good [ ] Fair [ ] Poor*

8. Are the facilities to flush solids and grease from basin walls adequate? [ ] Yes [ ] No* [x] N/A

9. Are there facilities for withdrawing floating material and foam? [ ] Yes [x] No

10. How are solids removed? [x] Drain down [ ] Drag line
    [x] Other: ***County VacTruck is also available***
    Is it adequate? [x] Yes [ ] No*

11. Is the emergency overflow in good condition? [ ] Yes [ ] No* [x] N/A

12. Are the depth gauges in good condition? [ ] Yes [ ] No [x] N/A

13. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: Wastewater flows from the grit chamber to a splitter box that distributes flow to the two flow equalization basins. Wastewater is pumped from each basin to the flow control box, where it gravity flows to the splitter box prior to the aeration basins. Excess flow in the flow control box is returned to the EQ Basins.

The EQ Basins may be bypassed; flows can be diverted from the grit channel directly to the aeration basins.

UNIT PROCESS: Sewage Pumping

1.	Name of station:	***EQ Basin Pump Station***		
2.	Location (if not at STP):	***N/A***		
3.	Following equipment operable:			
	a. All pumps?	[x] Yes	[ ] No*	
	b. Ventilation?	[x] Yes	[ ] No*	[ ] N/A
	c. Control system?	[x] Yes	[ ] No*	[ ] N/A
	d. Sump pump?	[x] Yes	[ ] No*	[ ] N/A
	e. Seal water system?	[ ] Yes	[ ] No*	[x] N/A
4.	Reliability considerations:			
	a. Class	[ ] I	[x] II	[ ] III
	b. Alarm system operable?	[x] Yes	[ ] No	[ ] N/A
	c. Alarm conditions monitored:			
	1. high water level:	[x] Yes	[ ] No*	[ ] N/A
	2. high liquid level in dry well:	[ ] Yes	[ ] No*	[x] N/A
	3. main electric power:	[ ] Yes	[ ] No*	[x] N/A
	4. auxiliary electric power:	[ ] Yes	[ ] No*	[x] N/A
	5. failure of pump motors to start:	[ ] Yes	[ ] No*	[x] N/A
	6. test function:	[x] Yes	[ ] No*	
	7. other:	N/A		
	d. Backup for alarm system operational?	[x] Yes	[ ] No*	[ ] N/A
	e. Alarm signal reported to (identify):	***local audible & visual, with autodialer***		
	f. Continuous operability provisions:			
	1. Generator hook up?	[x] Yes	[ ] No	***On Site Generator***
	2. Two sources of electricity?	[ ] Yes	[x] No	
	3. Portable pump?	[ ] Yes	[x] No	
	4. 1 day storage?	[ ] Yes	[x] No	
	5. other:	N/A		
5.	Does station have bypass?	[ ] Yes*	[x] No	
	a. Evidence of bypass use?	[ ] Yes*	[ ] No	[x] N/A
	b. Can bypass be disinfected?	[ ] Yes	[ ] No*	[x] N/A
	c. Can bypass be measured?	[ ] Yes	[ ] No*	[x] N/A
6.	How often is station checked?	***Once daily***		
7.	General condition:	[x] Good	[ ] Fair	[ ] Poor*

Comments: Two submersible pumps pump wastewater from the EQ basins to the flow control box, where it gravity flows to the splitter box prior to the aeration basins. Excess flow in the flow control box is returned to the EQ Basins. The pumps automatically alternate lead and lag mode. If flow is continuous, the lead pump is alternated daily.

UNIT PROCESS: Activated Sludge Aeration

1. Number of units: ***2 ("new plant" and "old plant")***
   Number of units in operation: ***1 ("new plant")***

2. Mode of operation: ***Extended Aeration***

3. Proper flow distribution between units? [ ] Yes [ ] No* [x] N/A

4. Foam control operational? [x] Yes [ ] No* [ ] N/A

5. Scum control operational? [ ] Yes [ ] No* [x] N/A

6. Evidence of the following problems:
   a. Dead spots? [ ] Yes* [x] No
   b. Excessive foam? [ ] Yes* [x] No
   c. Poor aeration? [ ] Yes* [x] No
   d. Excessive aeration? [ ] Yes* [x] No
   e. Excessive scum? [ ] Yes* [x] No
   f. Aeration equipment malfunction? [ ] Yes* [x] No
   g. Other:

7. Mixed liquor characteristics for 12/20/10

pH:	***6.9 SU***	MLSS:	***2880 mg/L (target is 3000 mg/l)***
DO:	***0.3 mg/L***	SDI:	
SVI:		Color:	***Medium Brown***
Odor:	***earthy***	Settleability:	***480 ml/l in 30 minutes***
		Other:	

8. Return/waste sludge:
   a. return rate: ***Not measured– continuous air lift with aeration***
   b. waste rate: ***Not measured; 10– 15 minutes at a time, based on MLSS***
   c. frequency of wasting: ***Daily***

9. Aeration system control: [ ] Time Clock [ ] Manual [x] Continuous [ ] Other

10. Effluent control devices working properly *(oxidation ditches)*? [ ] Yes [ ] No [x] N/A

11. General condition: [x] Good [ ] Fair [ ] Poor *

Comments: One of two aeration basin – clarifier trains ("new plant") was in use at the time of inspection. Preceding the completion of collection system rehabilitation work in February 2006, both the "old plant" and "new plant" aeration basin – clarifier trains were required, due to I&I flow.

Two of four blowers are run at one time to provide aeration to the grit channel, EQ basins, aeration basins, digester and post aeration basin.

UNIT PROCESS: Sedimentation

[ ] Primary [x] Secondary [ ] Tertiary

1. Number of units: ***2 ("new plant" and "old plant")***
   In operation: ***1 ("new plant")***

2. Proper flow-distribution between units? [ ] Yes [ ] No* [x] N/A

3. Signs of short-circuiting and/or overloads? [ ] Yes* [x] No

4. Effluent weirs level? [x] Yes [ ] No* [ ] N/A
   Clean? [x] Yes [ ] No*

5. Scum collection system working properly? [x] Yes [ ] No* [ ] N/A

6. Sludge-collection system working properly? [x] Yes [ ] No* [ ] N/A

7. Influent, effluent baffle systems working properly? [x] Yes [ ] No* [ ] N/A

8. Chemical addition? [ ] Yes [x] No
   Chemicals: ***None utilized***

9. Effluent characteristics: ***Clear at time of inspection***

10. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: One of two aeration basin – clarifier trains ("new plant") was in use at the time of inspection. Preceding the completion of collection system rehabilitation work in February 2006, both the "old plant" and "new plant" aeration basin – clarifier trains were required, due to I&I flow.

UNIT PROCESS: Aerobic Digestion

1. Number of units: ***2***

   Number of units in operation: ***2***

2. Type of sludge treated: [ ] Primary [x] WAS [ ] Other:

3. Frequency of sludge application to digesters: ***1/day***

4. Supernatant return rate: ***Not measured***

5. pH adjustment provided? [ ] Yes [x] No

   Utilized: [ ] Yes [ ] No [x] N/A

6. Tank contents well-mixed and relatively free of odors? [x] Yes [ ] No*

7. If diffused aeration is used, do diffusers require frequent cleaning? [ ] Yes [x] No [ ] N/A

8. Location of supernatant return: [x] Head [ ] Primary [ ] Other

9. Process control testing: ***Not ascertained***

   a. percent volatile solids: [ ] Yes ______ % [x]No

   b. pH: [ ] Yes ______ SU [x] No

   c. alkalinity: [ ] Yes ______ mg/L [x] No

   d. dissolved oxygen: [ ] Yes ______ mg/L [x] No

10. Foaming problem present? [ ] Yes * [x] No

11. Signs of short-circuiting or overloads? [ ] Yes * [x] No

12. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: The sludge is allowed to settle and is then decanted to the headof the plant via a submersible pump. Thickened liquid sludge is periodically removed by a septic hauler and transported to Hanover County's Richfood Road Septage Receiving Station for disposal.

Two of four blowers are run at one time to provide aeration to the grit channel, EQ basins, aeration basins, digester and post aeration basin.

UNIT PROCESS: Drying Beds

1. Number of units: ***4***

   Number of units in operation: ***0***

   Number of beds with sludge: ***0***

2. Cover in good condition? [x] Yes [ ] No [ ] N/A

3. Typical sand depth in beds: ***~12 – 18 inches***

4. Typical drying time: ***N/A***

5. Frequency of usage: ***Last used in 1995***

6. Underflow recycle location: ***Head of the plant via plant drain***

7. Sludge distributed evenly across bed(s)? [ ] Yes [ ] No* [x] N/A

8. Following problems noted:
   a. Odors? [ ] Yes* [x] No
   b. Flies? [ ] Yes* [x] No
   c. Weed growth? [ ] Yes* [x] No
   d. Leakage from bed(s)? [ ] Yes* [x] No

9. If the facility does not have an approved sludge plan, what is the current method of sludge disposal? ***Approved plan includes current method of transporting liquid sludge to septage receiving station for disposal.***

10. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: None

UNIT PROCESS: Ultraviolet (UV) Disinfection

1.	Number of UV lamps/assemblies: Number in operation:	***2 Banks, each with Four 2-Bulb Modules*** ***2 Banks, all Bulbs***
2.	Type of UV system and design dosage:	***Low Pressure, Low Intensity, >85,000μws/cm²***
3.	Proper flow distribution between units?	[ ] Yes [ ] No* [x] N/A
4.	Method of UV intensity monitoring?	***E. coli monitoring***
5.	Adequate ventilation of ballast control boxes?	[x] Yes [ ] No* [ ] N/A
6.	Indication of on/off status of all lamps provided?	[x] Yes [ ] No*
7.	Lamps assemblies easily removed for maintenance?	[x] Yes [ ] No*
8.	Records of lamp operating hours & replacement dates provided:	[x] Yes [ ] No*
9.	Routine cleaning system provide Operated properly? Frequency of routine cleaning:	[x] Yes [ ] No* [x] Yes [ ] No* ***One of two banks cleaned each week***
10.	Lamp energy control system operating properly?	[x] Yes [ ] No*
11.	Date of last system overhaul:	
	a. UV unit completely drained	[ ] Yes [ ] No* [x] N/A – ***effluent channel***
	b. all surfaces cleaned	[x] Yes [ ] No*
	c. UV transmissibility checked	[x] Yes [ ] No*
	d. output of selected lamps checked	[x] Yes [ ] No*
	e. output of tested lamps	***N/A***
	f. total operating hours, oldest lamp/assembly	***5007*** ***hrs. Bank 1 -*** ***5264*** ***hrs. Bank 2***
	g. number of spare lamps and ballasts available:	lamps: ***2**** ballasts: ***5****
12.	UV protective eyeglasses provided:	[x] Yes [ ] No*
13.	General condition:	[x] Good [ ] Fair [ ] Poor*

Comments: This unit consists of (two) 2-module banks of lights in series in the plant's effluent channel. One bank of lights (2 modules) is removed and cleaned weekly. *Doswell and Ashland WWTPs use the same UV systems so that spare parts in storage at these WWTPs are available if needed.

UNIT PROCESS: Flow Measurement

[] Influent [] Intermediate [x] Effluent

1.	Type measuring device:	***90° v-notch weir with stilling well, ultrasonic sensor and TIRE***		
2.	Present reading:	***Instantaneous: 1.2 gpm @ 1045 hrs. (plant in "waste" mode)***		
3.	Bypass channel?	[] Yes	[x] No	
	Metered?	[] Yes	[] No*	[x] N/A
4.	Return flows discharged upstream from meter?	[] Yes	[x] No	
	If Yes, identify:	N/A		
5.	Device operating properly?	[x] Yes	[] No*	
6.	Date of last calibration:	***December 14, 2010***		
7.	Evidence of following problems:			
	a. Obstructions?	[] Yes*	[x] No	
	b. Grease?	[] Yes*	[x] No	
8.	General condition:	[x] Good	[] Fair	[] Poor*

Comments: None

UNIT PROCESS: Post Aeration

1. Number of units: ***1***

   Number of units in operation: ***1***

2. Proper flow-distribution between units? [ ] Yes [ ] No* [x] N/A

3. Evidence of following problems:

a. Dead spots? [ ] Yes* [x] No

b. Excessive foam? [ ] Yes* [x] No

c. Poor aeration? [ ] Yes* [x] No

d. Mechanical equipment failure? [ ] Yes* [x] No [ ] N/A

4. How is the aerator controlled? [ ] Time clock [ ] Manual [x] Continuous

   [ ] Other ___________ [ ] N/A

5. What is the current operating schedule? ***Continuous***

6. Step weirs level? [x] Yes [ ] No* [ ] N/A

7. Effluent D.O. level: ***Not obtained***

8. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: Two of four blowers are run at one time to provide aeration to the grit channel, EQ basins, aeration basins, digester and post aeration basin.

UNIT PROCESS: Effluent/Plant Outfall

1. Type outfall: [x] Shore based [ ] Submerged

2. Type if shore based: [ ] Wingwall [x] Headwall [ ] Rip Rap [ ] N/A

3. Flapper valve? [ ] Yes [x] No

4. Erosion of bank? [ ] Yes* [ ] No [ ] N/A

5. Effluent plume visible? [ ] Yes * [ ] No

Comments: The outfall on the Pamunkey River was not viewed due to the remote location and snow covered access.

6. Condition of outfall and supporting structures: [ ] Good [ ] Fair [ ] Poor *

7. Final effluent, evidence of following problems:

   a. Oil sheen? [ ] Yes* [x] No*

   b. Grease? [ ] Yes* [x] No*

   c. Sludge bar? [ ] Yes* [ ] No

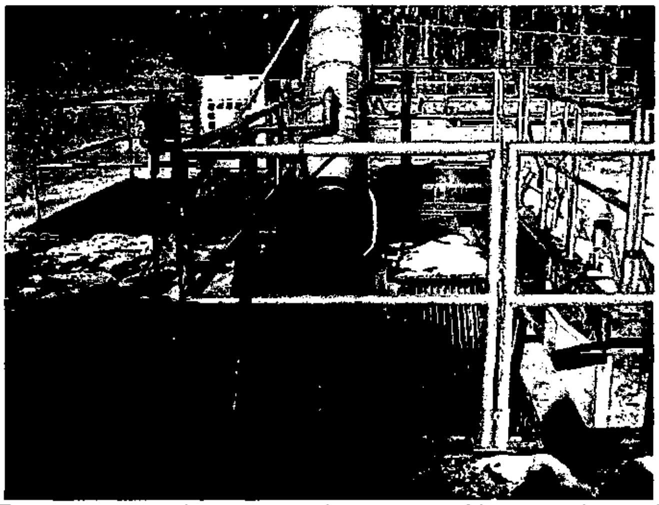
   d. Turbid effluent? [ ] Yes* [x] No*

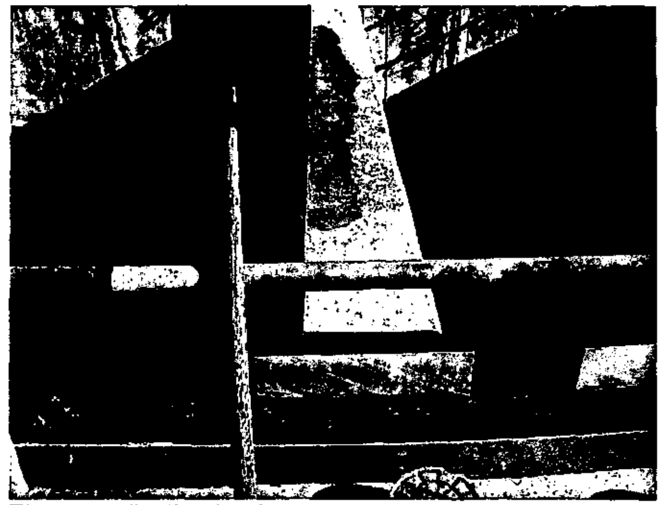
   e. Visible foam? [ ] Yes* [x] No*

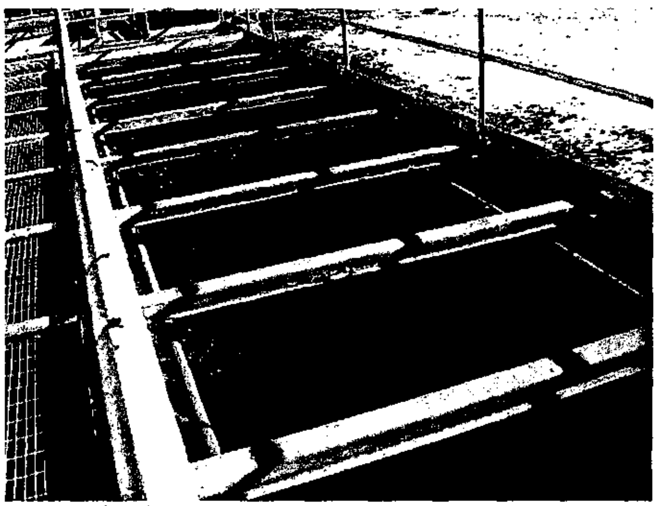
   f. Unusual odor? [ ] Yes* [x] No*

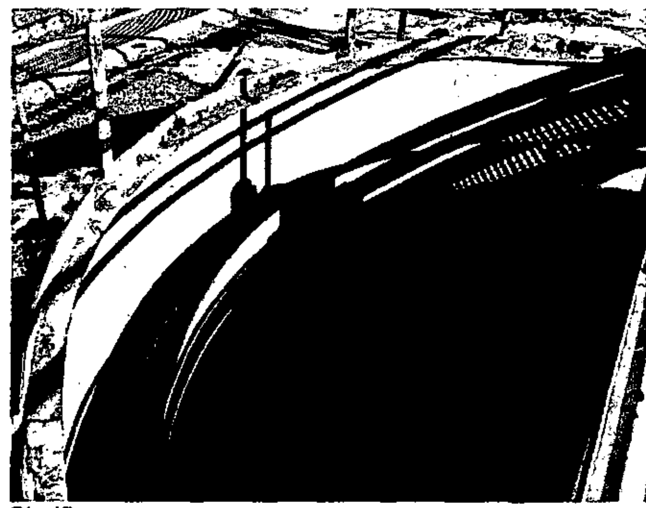
Comments: The outfall on the Pamunkey River was not viewed due to the remote location and snow covered access. *None of the above problems were noted at the post aeration basin.

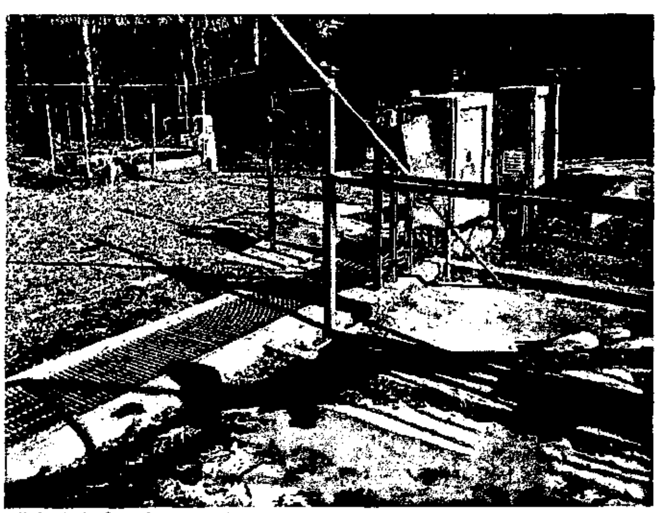
INSPECTION PHOTOS

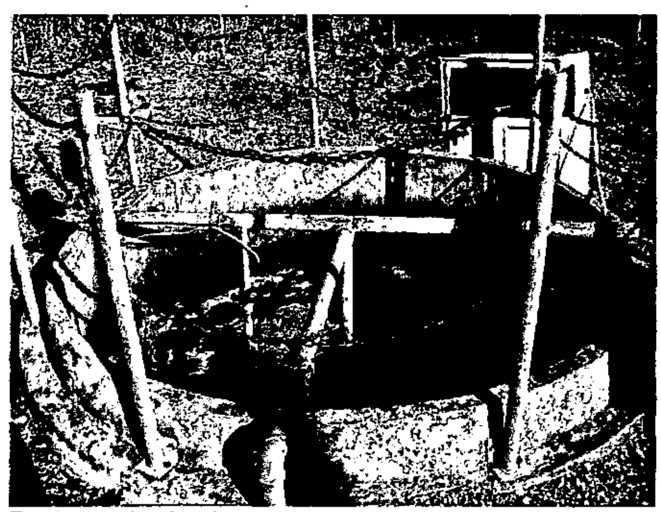

Rotamat screenings removal system and bypass channel


Flow equalization basins


Aeration basin


Clarifier


UV disinfection system


Post aeration basin

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
LABORATORY INSPECTION REPORT

10/01

FACILITY NO:	INSPECTION DATE:	PREVIOUS INSP. DATE:	PREVIOUS EVALUATION:	TIME SPENT:
VA0062154	December 21, 2010	June 28, 2006	No Deficiencies	6 hours w/ travel & report

NAME/ADDRESS OF FACILITY:	FACILITY CLASS:	FACILITY TYPE:	UNANNOUNCED INSPECTION?
Hanover Courthouse WWTP P.O. Box 470 Hanover, VA 23069 Located on the east side of Route 301 just North of the Courthouse Complex	( ) MAJOR (X) MINOR ( ) SMALL ( ) VPA/NDC	(X) MUNICIPAL ( ) INDUSTRIAL ( ) FEDERAL ( ) COMMERCIAL LAB	( ) YES (X) NO **FY-SCHEDULED INSPECTION?** (X) YES ( ) NO

INSPECTOR(S):	REVIEWERS:	PRESENT AT INSPECTION:
Mike Dare MDare 12-28-10	JKS 12/28/10 KW 12/28/10	Barbara Mitchell

LABORATORY EVALUATION	DEFICIENCIES? Yes	No
LABORATORY RECORDS		X
GENERAL SAMPLING & ANALYSIS		X
LABORATORY EQUIPMENT		X
pH ANALYSIS PROCEDURES		X
DISSOLVED OXYGEN ANALYSIS PROCEDURES		X

QUALITY ASSURANCE/QUALITY CONTROL

Y/N	QUALITY ASSURANCE METHOD	PARAMETERS	FREQUENCY
	REPLICATE SAMPLES		
	SPIKED SAMPLES		
	STANDARD SAMPLES		
	SPLIT SAMPLES		
	SAMPLE BLANKS		
	OTHER		
	EPA-DMR QA DATA?	RATING: ( ) No Deficiency ( ) Deficiency (X) NA	
	QC SAMPLES PROVIDED?	RATING: ( ) No Deficiency ( ) Deficiency (X) NA	

COPIES TO: (X) DEQ - PRO; ( ) OWCP; (X) OWNER; ( ) EPA-Region III; ( ) Other:

FACILITY #: VA0062154

LABORATORY RECORDS SECTION

LABORATORY RECORDS INCLUDE THE FOLLOWING:

X	SAMPLING DATE	X	ANALYSIS DATE	X	CONT MONITORING CHART
X	SAMPLING TIME	X	ANALYSIS TIME	X	INSTRUMENT CALIBRATION
X	SAMPLE LOCATION	X	TEST METHOD	X	INSTRUMENT MAINTENANCE
				X	CERTIFICATE OF ANALYSIS

WRITTEN INSTRUCTIONS INCLUDE THE FOLLOWING:

X	SAMPLING SCHEDULES	X	CALCULATIONS	X	ANALYSIS PROCEDURES

	YES	NO	N/A
DO ALL ANALYSTS INITIAL THEIR WORK?	X		
DO BENCH SHEETS INCLUDE ALL INFORMATION NECESSARY TO DETERMINE RESULTS?	X		
IS THE DMR COMPLETE AND CORRECT? MONTH(S) REVIEWED: ***October 2010***	X		
ARE ALL MONITORING VALUES REQUIRED BY THE PERMIT REPORTED?	X		

GENERAL SAMPLING AND ANALYSIS SECTION

	YES	NO	N/A
ARE SAMPLE LOCATION(S) ACCORDING TO PERMIT REQUIREMENTS?	X		
ARE SAMPLE COLLECTION PROCEDURES APPROPRIATE?	X		
IS SAMPLE EQUIPMENT CONDITION ADEQUATE?	X		
IS FLOW MEASUREMENT ACCORDING TO PERMIT REQUIREMENTS?	X		
ARE COMPOSITE SAMPLES REPRESENTATIVE OF FLOW?	X		
ARE SAMPLE HOLDING TIMES AND PRESERVATION ADEQUATE?	X		
IF ANALYSIS IS PERFORMED AT ANOTHER LOCATION, ARE SHIPPING PROCEDURES ADEQUATE? LIST PARAMETERS AND NAME & ADDRESS OF LAB: **Doswell WWTP Lab – BOD; Totopotomoy WWTP Lab – TSS, E. coli; J. R. Reed (Newport News, VA) - TKN**	X		

LABORATORY EQUIPMENT SECTION

	YES	NO	N/A
IS LABORATORY EQUIPMENT IN PROPER OPERATING RANGE?	X		
ARE ANNUAL THERMOMETER CALIBRATION(S) ADEQUATE?	X		
IS THE LABORATORY GRADE WATER SUPPLY ADEQUATE?			X
ARE ANALYTICAL BALANCE(S) ADEQUATE?			X

LABORATORY INSPECTION REPORT SUMMARY

FACILITY NAME:	FACILITY NO:	INSPECTION DATE:
Hanover Courthouse STP	VA0062154	December 21, 2010
LABORATORY EVALUATION:	( ) **Deficiencies** (X) **No Deficiencies**	

LABORATORY RECORDS

No deficiencies were noted

GENERAL SAMPLING AND ANALYSIS

No deficiencies were noted

LABORATORY EQUIPMENT

No deficiencies were noted

INDIVIDUAL PARAMETERS

pH ANALYSIS PROCEDURES:

No deficiencies were noted

DISSOLVED OXYGEN ANALYSIS PROCEDURES:

No deficiencies were noted

ANALYST:	**Barbara Mitchell**	VPDES NO	**VA0062154**

Meter:Orion 3 Star

Parameter: Hydrogen Ion (pH)
1/08

Method: Electrometric

METHOD OF ANALYSIS:

x	18th Edition of Standard Methods – 4500-H^+ B
	21st or Online Editions of Standard Methods – 4500-H^+ B (00)

	pH is a method-defined analyte so modifications are not allowed. [40 CFR Part 136.6]	**Y**	**N**
1)	Is a certificate of operator competence or initial demonstration of capability available for each analyst/operator performing this analysis? **NOTE**: Analyze 4 samples of known pH. May use external source of buffer (different lot/manufacturer than buffers used to calibrate meter). Recovery for each of the 4 samples must be +/- 0.1 SU of the known concentration of the sample. [SM 1020 B.1]	x	
2)	Is the electrode in good condition (no chloride precipitate, scratches, deterioration, etc.)? [2.b/c and 5.b]	x	
3)	Is electrode storage solution in accordance with manufacturer's instructions? [Mfr.]	x	
4)	Is meter calibrated on at least a daily basis using three buffers all of which are at the same temperature? [4.a] **NOTE**: Follow manufacturer's instructions.	x	
5)	After calibration, is a buffer analyzed as a check sample to verify that calibration is correct? Agreement should be within +/- 0.1 SU. [4.a]	x	
6)	Do the buffer solutions appear to be free of contamination or growths? [3.1]	x	
7)	Are buffer solutions within the listed shelf-life or have they been prepared within the last 4 weeks? [3.a]	x	
8)	Is the cap or sleeve covering the access hole on the reference electrode removed when measuring pH? [Mfr.]	x	
9)	For meters with ATC that also have temperature display, is the thermometer verified annually? [SM 2550 B.1]	x	
10)	Is temperature of buffer solutions and samples recorded when determining pH? [4.a]	x*	
11)	Is sample analyzed within 15 minutes of collections? [40 CFR Part 136]	x	
12)	Is the electrode rinsed and then blotted dry between reading solutions (Disregard if a portion of the next sample analyzed is used as the rinsing solution.)? [4.a]	x	
13)	Is the sample stirred gently at a constant speed during measurement? [4.b]	x	
14)	Does the meter hold a steady reading after reaching equilibrium? [4.b]	x	
15)	Is a duplicate sample analyzed after every 20 samples if citing 18th or 19th Edition or daily for 20th or 21st Edition? [Part 1020] **NOTE**: Not required for *in situ* samples.	N/A	
16)	Is the pH of duplicate samples within 0.1SU of the original sample? [Part 1020]	N/A	
17)	Is there a written procedure for which result will be reported on DMR (Sample or Duplicate) and is this procedure followed? [DEQ]	N/A	

COMMENTS: *Ms. Mitchell reported that she would add a "sample temperature" column to the bench sheet and begin recording this value

ANALYST:	Barbara Mitchell	VPDES NO	VA0062154

Meter: YSI 50B

Parameter: Dissolved Oxygen
Method: Membrane Electrode
Facility Elevation ~100'
1/08

METHOD OF ANALYSIS:

x	18th Edition of Standard Methods – 4500-O G
	21st or Online Editions of Standard Methods – 4500-O G (01)

	DO is a method-defined analyte so modifications are not allowed. [40 CFR Part 136.6]	**Y**	**N**
1)	If samples are collected, is collection carried out with a minimum of turbulence and air bubble formation and is the sample bottle allowed to overflow several times its volume? [1.c]	**In-situ**	
2)	Are meter and electrode operable and providing consistent readings? [3]	**x**	
3)	Is membrane in good condition without trapped air bubbles? [3.b]	**x**	
4)	Is correct filling solution used in electrode? [Mfr.]	**x**	
5)	Are water droplets shaken off the membrane prior to calibration? [Mfr.]	**x**	
6)	Is meter calibrated before use or at least daily? [Mfr. & Part 1020]	**x**	
7)	Is calibration procedure performed according to manufacturer's instructions? [Mfr.]	**x**	
8)	Is sample stirred during analysis? [Mfr.]	**In-situ**	
9)	Is the sample analysis procedure performed according to manufacturer's instructions? [Mfr.]	**x**	
10)	Is meter stabilized before reading D.O.? [Mfr.]	**x**	
11)	Is electrode stored according to manufacturer's instructions? [Mfr.]	**x**	
12)	Is a duplicate sample analyzed after every 20 samples if citing 18th or 19th Edition or daily if citing 20th or 21st Edition? [Part 1020] **NOTE**: Not required for *in situ* samples.	**N/A**	
13)	If a duplicate sample is analyzed, is the reported value for that sampling event the average concentration of the sample and the duplicate? [DEQ]	**N/A**	
14)	If a duplicate sample is analyzed, is the relative percent difference (RPD) ≤ 20? [18th ed. Table 1020 I; 21st ed. DEQ]	**N/A**	

PROBLEMS: None

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
SAMPLE ANALYSIS HOLDING TIME/CONTAINER/PRESERVATION CHECK SHEET
Revised 3/08 [40 CFR, Part 136.3, Table II]

FACILITY NAME:	Hanover Courthouse WWTP	VPDES NO	VA0062154	DATE:	December 21, 2010

HOLDING TIMES						SAMPLE CONTAINER				PRESERVATION				
PARAMETER	APPROVED	MET?		LOGGED?		ADEQ. VOLUME		APPROP. TYPE		APPROVED	MET?		CHECKED?	
		Y	N	Y	N	Y	N	Y	N		Y	N	Y	N
BOD5 & CBOD5	48 HOURS	x		x		x		x		ANALYZE 2 HRS or 6°C	x		x	
TSS	7 DAYS	x		x		x		x		6°C	x		x	
FECAL COLIFORM / *E. coli / Enterococci*	6 HRS & 2 HRS TO PROCESS	x		x		x		x		10°C (1 HOUR)+ 0.008% $Na_2S_2O_3$	x		x	
pH	15 MIN.	x		x		x		x		N/A				
CHLORINE	15 MIN.									N/A				
DISSOLVED O_2	15 MIN./IN SITU	x		x		x		x		N/A				
TEMPERATURE	IMMERSION STAB.									N/A				
OIL & GREASE	28 DAYS									6°C + H_2SO_4/HCL pH<2				
AMMONIA	28 DAYS									6°C + H_2SO_4 pH<2 DECHLOR				
TKN	28 DAYS	x		x		x		x		6°C + H_2SO_4 pH<2 DECHLOR	x		x	
NITRATE	48 HOURS									6°C				
NITRATE+NITRITE	28 DAYS									6°C + H_2SO_4 pH<2				
NITRITE	48 HOURS									6°C				
PHOSPHATE, ORTHO	48 HOURS									FILTER, 6°C				
TOTAL PHOS.	28 DAYS									6°C+ H_2SO_4 pH<2				
METALS (except Hg)	6 MONTHS									HNO_3 pH<2				
MERCURY (CVAA)	28 DAYS									HNO_3 pH<2				
PROBLEMS: None										PROBLEMS: None				

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
EQUIPMENT TEMPERATURE LOG/THERMOMETER VERIFICATION CHECK SHEET
1/08

FACILITY NAME:	Hanover Courthouse WWTP	VPDES NO:	VA0062154	DATE:	December 21, 2010

EQUIPMENT	RANGE	IN RANGE		INSPECT READING °C	CHECK & LOG DAILY		CORRECT INCREMENT		ANNUAL THERMOMETER VERIFICATION				
									Is the NIST / NIST-Traceable Reference Thermometer within the manufacturer's expiration date or recertified yearly?				Yes
									DATE CHECKED	MARKED		CORR FACTOR	INSPECT TEMP
		Y	N		Y	N	Y	N		Y	N	°C	°C
SAMPLE REFRIGER.	1-6°C			*									
AUTO SAMPLER	1-6° C	x		4.0	x		x		9/15/10	x		0	
BOD INCUBATOR	20 ± 1° C												
SOLIDS DRYING OVEN	103-105° C												
WATER BATH	44.5 ± .2° C												
INCUBATOR	35± .5° C												
AUTOCLAVE	121° C IN 30 MIN												
HOT AIR STERILIZING	170 ± 10° C												
O & G WATER BATH	70± 2° C												
REAGENT REFRIGER.	1-6° C												
pH METER	± 1° C								9/15/10	x		0	
DO METER	± 1° C								9/15/10	x		0	
THERMOMETER-OUTFALL	± 1° C												
Hg WATER BATH	95 °C												

COMMENTS: *Once collected, samples are placed on ice for transport to the various labs.

Attachment G1

Water Quality Criteria Monitoring

ATTACHMENT A
DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY CRITERIA MONITORING

Effective January 1, 2012, all analyses shall be in accordance with 1VAC30-45, Certification for Noncommercial Environmental Laboratories, or 1VAC30-46, Accreditation for Commercial Environmental Laboratories.

A listing of Virginia Environmental Laboratory Accreditation Program (VELAP) certified and/or accredited laboratories can be found at the following website:
http://www.dgs.state.va.us/DivisionofConsolidatedLaboratoryServices/Services/EnvironmentalLaboratoryCertification/tabid/1059/Default.aspx

Please be advised that additional water quality analyses may be necessary and/or required for permitting purposes.
NOTE: results are in µg/l

CASRN	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL(1)	REPORTING RESULTS	SAMPLE TYPE(2)	SAMPLE FREQUENCY
METALS						
7440-36-0	Antimony, dissolved	(3)	260,000	<1.00	C	1/5 YR
7440-38-2	Arsenic, dissolved	(3)	9,300	<1.00	C	1/5 YR
7440-43-9	Cadmium, dissolved	(3)	30	<0.050	C	1/5 YR
16065-83-1	Chromium III, dissolved (6)	(3)	1,900	<1.00	C	1/5 YR
18540-29-9	Chromium VI, dissolved (6)	(3)	600	<1.00	C	1/5 YR
7440-50-8	Copper, dissolved	(3)	180	2.90	C	1/5 YR
7439-92-1	Lead, dissolved	(3)	210	0.13	C	1/5 YR
7439-97-6	Mercury, dissolved	(3)	3.1	<0.10	C	1/5 YR
7440-02-0	Nickel, dissolved	(3)	500	0.69	C	1/5 YR
7782-49-2	Selenium, Total Recoverable	(3)	310	<0.50	C	1/5 YR
7440-22-4	Silver, dissolved	(3)	20	<0.10	C	1/5 YR
7440-28-0	Thallium, dissolved	(3)	(4)	<0.10	C	1/5 YR
7440-66-6	Zinc, dissolved	(3)	1,800	25.0	C	1/5 YR
PESTICIDES/PCBs						
309-00-2	Aldrin	608/625	0.05	<0.050	C	1/5 YR
57-74-9	Chlordane	608/625	0.2	ND	C	1/5 YR
2921-88-2	Chlorpyrifos (synonym = Dursban)	622	(4)	<0.100	C	1/5 YR
72-54-8	DDD	608/625	0.1	<0.050	C	1/5 YR
72-55-9	DDE	608/625	0.1	<0.050	C	1/5 YR
50-29-3	DDT	608/625	0.1	<0.050	C	1/5 YR

CASRN	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL[1]	REPORTING RESULTS	SAMPLE TYPE[2]	SAMPLE FREQUENCY
8065-48-3	Demeton (synonym = Dementon-O,S)	622	(4)	<0.100	C	1/5 YR
333-41-5	Diazinon	622	(4)	<0.100	C	1/5 YR
60-57-1	Dieldrin	608/625	0.1	<0.050	C	1/5 YR
959-98-8	Alpha-Endosulfan (synonym = Endosulfan I)	608/625	0.1	<0.050	C	1/5 YR
33213-65-9	Beta-Endosulfan (synonym = Endosulfan II)	608625	0.1	<0.050	C	1/5 YR
1031-07-8	Endosulfan Sulfate	608/625	0.1	<0.050	C	1/5 YR
72-20-8	Endrin	608/625	0.1	<0.050	C	1/5 YR
7421-93-4	Endrin Aldehyde	608/625	(4)	<0.050	C	1/5 YR
86-50-0	Guthion (synonym = Azinphos Methyl)	622	(4)	<0.100	C	1/5 YR
76-44-8	Heptachlor	608/625	0.05	<0.050	C	1/5 YR
1024-57-3	Heptachlor Epoxide	608/625	(4)	<0.050	C	1/5 YR
319-84-6	Hexachlorocyclohexane Alpha-BHC	608/625	(4)	<0.050	C	1/5 YR
319-85-7	Hexachlorocyclohexane Beta-BHC	608/625	(4)	<0.050	C	1/5 YR
58-89-9	Hexachlorocyclohexane Gamma-BHC (syn. = Lindane)	608/625	(4)	<0.050	C	1/5 YR
143-50-0	Kepone	8081 Extended/ 8270C/8270D	(4)	<0.600	C	1/5 YR
121-75-5	Malathion	614	(4)	<1.000	C	1/5 YR
72-43-5	Methoxychlor	608.2	(4)	<0.050	C	1/5 YR
2385-85-5	Mirex	8081 Extended/ 8270C/8270D	(4)	<0.050	C	1/5 YR
56-38-2	Parathion (synonym = Parathion Ethyl)	614	(4)	<1.000	C	1/5 YR
1336-36-3	PCB, total	608/625	7.0	ND	C	1/5 YR
8001-35-2	Toxaphene	608/625	5.0	ND	C	1/5 YR
BASE NEUTRAL EXTRACTABLES						
83-32-9	Acenaphthene	610/625	10.0	<10.0	C	1/5 YR
120-12-7	Anthracene	610/625	10.0	<10.0	C	1/5 YR
92-87-5	Benzidine	625	(4)	<10.0	C	1/5 YR
56-55-3	Benzo (a) anthracene	610/625	10.0	<10.0	C	1/5 YR
205-99-2	Benzo (b) fluoranthene	610/625	10.0	<10.0	C	1/5 YR
207-08-9	Benzo (k) fluoranthene	610/625	10.0	<10.0	C	1/5 YR
50-32-8	Benzo (a) pyrene	610/625	10.0	<10.0	C	1/5 YR
111-44-4	Bis 2-Chloroethyl Ether	625	(4)	<10.0	C	1/5 YR

CASRN	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL[1]	REPORTING RESULTS	SAMPLE TYPE[2]	SAMPLE FREQUENCY
108-60-1	Bis 2-Chloroisopropyl Ether	625	(4)	<10.0	C	1/5 YR
117-81-7	Bis 2-Ethylhexyl Phthalate (syn. = Di-2-Ethylhexyl Phthalate)	625	10.0	<10.0	C	1/5 YR
85-68-7	Butyl benzyl phthalate	625	10.0	<10.0	C	1/5 YR
91-58-7	2-Chloronaphthalene	625	(4)	<10.0	C	1/5 YR
218-01-9	Chrysene	610/625	10.0	<10.0	C	1/5 YR
53-70-3	Dibenzo (a,h) anthracene	610/625	20.0	<10.0	C	1/5 YR
95-50-1	1,2-Dichlorobenzene	602/624	10.0	<10.0	C	1/5 YR
541-73-1	1,3-Dichlorobenzene	602/624	10.0	<10.0	C	1/5 YR
106-46-7	1,4-Dichlorobenzene	602/624	10.0	<10.0	C	1/5 YR
91-94-1	3,3-Dichlorobenzidine	625	(4)	<10.0	C	1/5 YR
84-66-2	Diethyl phthalate	625	10.0	<10.0	C	1/5 YR
131-11-3	Dimethyl phthalate	625	(4)	<10.0	C	1/5 YR
84-74-2	Di-n-butyl Phthalate (synonym = Dibutyl Phthalate)	625	10.0	<10.0	C	1/5 YR
121-14-2	2,4-Dinitrotoluene	625	10.0	<10.0	C	1/5 YR
122-66-7	1,2-Diphenylhydrazine	625/ 8270C/8270D	(4)	<10.0	C	1/5 YR
206-44-0	Fluoranthene	610/625	10.0	<10.0	C	1/5 YR
86-73-7	Fluorene	610/625	10.0	<10.0	C	1/5 YR
118-74-1	Hexachlorobenzene	625	(4)	<10.0	C	1/5 YR
87-68-3	Hexachlorobutadiene	625	(4)	<10.0	C	1/5 YR
77-47-4	Hexachlorocyclopentadiene	625	(4)	<10.0	C	1/5 YR
67-72-1	Hexachloroethane	625	(4)	<10.0	C	1/5 YR
193-39-5	Indeno(1,2,3-cd)pyrene	610/625	20.0	<10.0	C	1/5 YR
78-59-1	Isophorone	625	10.0	<10.0	C	1/5 YR
98-95-3	Nitrobenzene	625	10.0	<10.0	C	1/5 YR
62-75-9	N-Nitrosodimethylamine	625	(4)	<10.0	C	1/5 YR
621-64-7	N-Nitrosodi-n-propylamine	625	(4)	<10.0	C	1/5 YR
86-30-6	N-Nitrosodiphenylamine	625	(4)	<10.0	C	1/5 YR
129-00-0	Pyrene	610/625	10.0	<10.0	C	1/5 YR
120-82-1	1,2,4-Trichlorobenzene	625	10.0	<10.0	C	1/5 YR

VOLATILES

CASRN	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL(1)	REPORTING RESULTS	SAMPLE TYPE(2)	SAMPLE FREQUENCY
107-02-8	Acrolein	624	(4)	<50.0	G	1/5 YR
107-13-1	Acrylonitrile	624	(4)	<10.0	G	1/5 YR
71-43-2	Benzene	602/624	10.0	<10.0	G	1/5 YR
75-25-2	Bromoform	624	10.0	<10.0	G	1/5 YR
56-23-5	Carbon Tetrachloride	624	10.0	<10.0	G	1/5 YR
108-90-7	Chlorobenzene (synonym = Monochlorobenzene)	602/624	50.0	<10.0	G	1/5 YR
124-48-1	Chlorodibromomethane	624	10.0	<10.0	G	1/5 YR
67-66-3	Chloroform	624	10.0	<10.0	G	1/5 YR
75-27-4	Dichlorobromomethane	624	10.0	<10.0	G	1/5 YR
107-06-2	1,2-Dichloroethane	624	10.0	<10.0	G	1/5 YR
75-35-4	1,1-Dichloroethylene	624	10.0	<10.0	G	1/5 YR
156-60-5	1,2-trans-dichloroethylene	624	(4)	<10.0	G	1/5 YR
78-87-5	1,2-Dichloropropane	624	(4)	<10.0	G	1/5 YR
542-75-6	1,3-Dichloropropene	624	(4)	<10.0	G	1/5 YR
100-41-4	Ethylbenzene	602/624	10.0	<10.0	G	1/5 YR
74-83-9	Methyl Bromide (synonym = Bromomethane)	624	(4)	<10.0	G	1/5 YR
75-09-2	Methylene Chloride (synonym = Dichloromethane)	624	20.0	<10.0	G	1/5 YR
79-34-5	1,1,2,2-Tetrachloroethane	624	(4)	<10.0	G	1/5 YR
127-18-4	Tetrachloroethylene (synonym = Tetrachloroethene)	624	10.0	<10.0	G	1/5 YR
10-88-3	Toluene	602/624	10.0	<10.0	G	1/5 YR
79-00-5	1,1,2-Trichloroethane	624	(4)	<10.0	G	1/5 YR
79-01-6	Trichloroethylene (synonym = Trichloroethene)	624	10.0	<10.0	G	1/5 YR
75-01-4	Vinyl Chloride	624	10.0	<10.0	G	1/5 YR
ACID EXTRACTABLES						
95-57-8	2-Chlorophenol	625	10.0	<10.0	C	1/5 YR
120-83-2	2,4 Dichlorophenol	625	10.0	<10.0	C	1/5 YR
105-67-9	2,4 Dimethylphenol	625	10.0	<10.0	C	1/5 YR
51-28-5	2,4-Dinitrophenol	625	(4)	<10.0	C	1/5 YR
534-52-1	2-Methyl-4,6-Dinitrophenol	625	(4)	<10.0	C	1/5 YR
25154-52-3	Nonylphenol	ASTM D 7065-06	(4)	<10.0	C	1/5 YR

CASRN	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL(1)	REPORTING RESULTS	SAMPLE TYPE(2)	SAMPLE FREQUENCY
87-86-5	Pentachlorophenol	625	50.0	<10.0	C	1/5 YR
108-95-2	Phenol	625	10.0	<10.0	C	1/5 YR
88-06-2	2,4,6-Trichlorophenol	625	10.0	<10.0	C	1/5 YR
MISCELLANEOUS						
776-41-7	Ammonia as NH3-N	350.1	200	590	C	1/5 YR
16887-00-6	Chloride	(3)	(4)	56000	C	1/5 YR
7782-50-5	Chlorine, Total Residual	(3)	100	<100	G	1/5 YR
57-12-5	Cyanide, Free (8)	ASTM 4282-02	10.0	<10.0	G	1/5 YR
N/A	*E. coli / Enterococcus* (N/CML)	(3)	(4)	6	G	1/5 YR
18496-25-8	Sulfide, dissolved (7)	SM 4500 S^2 B	100	<10.0	C	1/5 YR
60-10-5	Tributyltin	(5)	(4)	<0.03	G	1/5 YR
471-34-1	Hardness (mg/L as $CaCO_3$)	(3)	(4)	92.6	C	1/5 YR

David F. Van Gelder

Name of Principal Executive Officer or Authorized Agent & Title

5.30.14

Signature of Principal Executive Officer or Authorized Agent & Date

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations. See 18 U.S.C. Sec. 1001 and 33 U.S.C. Sec. 1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

FOOTNOTES:

(1) Quantification level (QL) means the minimum levels, concentrations, or quantities of a target variable (e.g. target analyte) that can be reported with a specified degree of confidence in accordance with 1VAC30-45, Certification for Noncommercial Environmental Laboratories, or 1VAC30-46, Accreditation for Commercial Environmental Laboratories.

The quantification levels indicated for the metals are actually Specific Target Values developed for this permit. The Specific Target Value is the approximate value that may initiate a wasteload allocation analysis. Target values are not wasteload allocations or effluent limitations. The Specific Target Values are subject to change based on additional information such as hardness data, receiving stream flow, and design flows.

Units for the quantification level are micrograms/liter unless otherwise specified.

Quality control and quality assurance information (i.e. laboratory certificates of analysis) shall be submitted to document that the required quantification level has been attained.

(2) Sample Type

G = Grab = An individual sample collected in less than 15 minutes. Substances specified with "grab" sample type shall only be collected as grabs. The permittee may analyze multiple grabs and report the average results provided that the individual grab results are also reported. For grab metals samples, the individual samples shall be filtered and preserved immediately upon collection.

C = Composite = A 4-hour composite unless otherwise specified. The composite shall be a combination of individual samples, taken proportional to flow, obtained at hourly or smaller time intervals. The individual samples may be of equal volume for flows that do not vary by +/- 10 percent over a 24-hour period.

(3) A specific analytical method is not specified; however, an appropriate method to meet the QL shall be selected from any approved method presented in 40 CFR Part 136.

(4) The QL is at the discretion of the permittee. If the test result is less than the method QL, a "<[QL]" shall be reported where the actual analytical test QL is substituted for [QL].

(5) Analytical Methods: Analysis of Butyltins in Environmental Systems by the Virginia Institute of Marine Science, dated November 1996 (currently the only Virginia Environmental Laboratory Accreditation Program (VELAP) accredited method).

(6) Both Chromium III and Chromium VI may be measured by the total chromium analysis. The total chromium analytical test QL shall be less than or equal to the lesser of the Chromium III or Chromium VI method QL listed above. If the result of the total chromium analysis is less than the analytical test QL, both Chromium III and Chromium VI can be reported as "<[QL]", where the actual analytical test QL is substituted for [QL].

(7) Dissolved sulfide may be measured by the total sulfide analysis. The total sulfide analytical test QL shall be less than or equal to the dissolved sulfide method QL listed above. If the result of the total sulfide analysis is less than the analytical test QL, dissolved sulfide can be reported as "<[QL]", where the actual analytical test QL is substituted for [QL].

(8) Free cyanide may be measured by the total cyanide analysis. The total cyanide analytical test QL shall be less than or equal to the free cyanide method QL listed above. If the result of the total cyanide analysis is less than the analytical test QL, free cyanide can be reported as "<[QL]", where the actual analytical test QL is substituted for [QL].

ADDITIONAL NOTES TO PERMIT WRITERS: These notes should be deleted from this attachment.

1. The EPA Analysis No.'s cited above are anticipated to be the most frequently employed testing methods. Additional EPA-approved testing methods may be presented in 40 CFR Part 136. Permit writers are encouraged to consult with 40 CFR Part 136 and VELAP with regards to monitoring data obtained with non-cited testing methods.

2. Low-level source-specific PCB monitoring and reporting utilizing EPA Method 1668 (A, B, C, or other revisions prior to final promulgation) may be substituted for the PCB monitoring and reporting requirements specified above. See Guidance Memo 09-2001, Guidance for Monitoring of Point Sources for TMDL Development, for implementation procedures.

Attachment G2

Effluent Data from DMR

Facility Name:Hanover Courthouse STP **Permit No:VA0062154**

Outfall Number	Parameter Code	Parameter Description	Quant Avg	Quant Max	Conc Avg	Conc Min	Conc Max	Received Date
001	001	FLOW	0.072	0.094	NULL	NULL	NULL	10-May-11
			0.068	0.087	NULL	NULL	NULL	10-Jun-11
			0.075	0.103	NULL	NULL	NULL	11-Jul-11
			0.079	0.117	NULL	NULL	NULL	10-Aug-11
			0.068	0.106	NULL	NULL	NULL	12-Sep-11
			0.074	0.210	NULL	NULL	NULL	11-Oct-11
			0.055	0.069	NULL	NULL	NULL	10-Nov-11
			0.058	0.075	NULL	NULL	NULL	9-Dec-11
			0.064	0.090	NULL	NULL	NULL	10-Jan-12
			0.056	0.065	NULL	NULL	NULL	10-Feb-12
			0.058	0.083	NULL	NULL	NULL	12-Mar-12
			0.065	0.089	NULL	NULL	NULL	10-Apr-12
			0.065	0.086	NULL	NULL	NULL	10-May-12
			0.074	0.101	NULL	NULL	NULL	11-Jun-12
			0.073	0.086	NULL	NULL	NULL	10-Jul-12
			0.063	0.105	NULL	NULL	NULL	10-Aug-12
			0.065	0.075	NULL	NULL	NULL	10-Sep-12
			0.057	0.070	NULL	NULL	NULL	10-Oct-12
			0.053	0.079	NULL	NULL	NULL	13-Nov-12
			0.05	0.07	NULL	NULL	NULL	10-Dec-12
			0.056	0.074	NULL	NULL	NULL	10-Jan-13
			0.066	0.107	NULL	NULL	NULL	11-Feb-13
			0.059	0.090	NULL	NULL	NULL	11-Mar-13
			0.083	0.121	NULL	NULL	NULL	10-Apr-13
			0.068	0.084	NULL	NULL	NULL	10-May-13
			0.064	0.090	NULL	NULL	NULL	10-Jun-13
			0.069	0.092	NULL	NULL	NULL	10-Jul-13
			0.070	0.086	NULL	NULL	NULL	12-Aug-13
			0.060	0.096	NULL	NULL	NULL	9-Sep-13
			0.062	0.082	NULL	NULL	NULL	10-Oct-13
			0.063	0.080	NULL	NULL	NULL	12-Nov-13
			0.046	0.070	NULL	NULL	NULL	9-Dec-13
			0.049	0.068	NULL	NULL	NULL	10-Jan-14
			0.04	0.059	NULL	NULL	NULL	10-Feb-14
			0.051	0.067	NULL	NULL	NULL	10-Mar-14
			0.054	0.068	NULL	NULL	NULL	10-Apr-14
001	002	pH	NULL	NULL	NULL	7.1	7.40	10-Jun-10
			NULL	NULL	NULL	7.2	7.80	12-Jul-10
			NULL	NULL	NULL	7.1	7.60	10-Aug-10
			NULL	NULL	NULL	7.3	7.80	10-Sep-10
			NULL	NULL	NULL	7.2	7.90	12-Oct-10
			NULL	NULL	NULL	7.1	7.80	10-Nov-10
			NULL	NULL	NULL	7.0	7.80	10-Dec-10
			NULL	NULL	NULL	7.2	7.90	10-Jan-11
			NULL	NULL	NULL	7.1	7.90	10-Feb-11
			NULL	NULL	NULL	6.7	7.50	10-Mar-11
			NULL	NULL	NULL	6.8	7.10	11-Apr-11

Outfall Number	Parameter Code	Parameter Description	Quant Avg	Quant Max	Conc Avg	Conc Min	Conc Max	Received Date
001	002	pH	NULL	NULL	NULL	7.0	7.40	10-May-11
			NULL	NULL	NULL	6.9	7.40	10-Jun-11
			NULL	NULL	NULL	7.0	7.50	11-Jul-11
			NULL	NULL	NULL	7.2	7.70	10-Aug-11
			NULL	NULL	NULL	6.5	7.80	12-Sep-11
			NULL	NULL	NULL	7.1	7.70	11-Oct-11
			NULL	NULL	NULL	6.8	7.50	10-Nov-11
			NULL	NULL	NULL	6.9	7.50	9-Dec-11
			NULL	NULL	NULL	7.2	7.60	10-Jan-12
			NULL	NULL	NULL	7.2	7.80	10-Feb-12
			NULL	NULL	NULL	7.1	7.10	12-Mar-12
			NULL	NULL	NULL	7.1	7.60	10-Apr-12
			NULL	NULL	NULL	7.2	7.80	10-May-12
			NULL	NULL	NULL	7.1	7.90	11-Jun-12
			NULL	NULL	NULL	7.0	7.60	10-Jul-12
			NULL	NULL	NULL	7.0	7.60	10-Aug-12
			NULL	NULL	NULL	7.1	7.60	10-Sep-12
			NULL	NULL	NULL	6.9	7.60	10-Oct-12
			NULL	NULL	NULL	6.7	7.40	13-Nov-12
			NULL	NULL	NULL	6.6	7.40	10-Dec-12
			NULL	NULL	NULL	6.8	7.40	10-Jan-13
			NULL	NULL	NULL	6.7	7.50	11-Feb-13
			NULL	NULL	NULL	7.0	7.70	11-Mar-13
			NULL	NULL	NULL	6.7	7.50	10-Apr-13
			NULL	NULL	NULL	6.7	7.60	10-May-13
			NULL	NULL	NULL	6.8	7.20	10-Jun-13
			NULL	NULL	NULL	6.6	7.30	10-Jul-13
			NULL	NULL	NULL	6.8	7.40	12-Aug-13
			NULL	NULL	NULL	6.8	7.50	9-Sep-13
			NULL	NULL	NULL	7.0	7.80	10-Oct-13
			NULL	NULL	NULL	7.1	7.60	12-Nov-13
			NULL	NULL	NULL	7.1	7.90	9-Dec-13
			NULL	NULL	NULL	7.1	7.60	10-Jan-14
			NULL	NULL	NULL	7.0	7.40	10-Feb-14
			NULL	NULL	NULL	7.0	7.60	10-Mar-14
			NULL	NULL	NULL	7.0	7.60	10-Apr-14
001	003	BOD5	492	984	2.5	NULL	5.0	10-Jun-10
			<QL	<QL	<QL	NULL	<QL	12-Jul-10
			<QL	<QL	<QL	NULL	<QL	10-Aug-10
			<QL	<QL	<QL	NULL	<QL	10-Sep-10
			<QL	<QL	<QL	NULL	<QL	12-Oct-10
			705	1410	3.5	NULL	6.9	10-Nov-10
			792	1584	4.7	NULL	9.3	10-Dec-10
			3165	4306	11.3	NULL	14.4	10-Jan-11
			2772	4039	13.5	NULL	19.4	10-Feb-11
			4183	4996	17.2	NULL	19.7	10-Mar-11
			888	1775	3.4	NULL	6.7	11-Apr-11
			<QL	<QL	<QL	NULL	<QL	10-May-11
			1198	1931	4.7	NULL	8.1	10-Jun-11

Outfall Number	Parameter Code	Parameter Description	Quant Avg	Quant Max	Conc Avg	Conc Min	Conc Max	Received Date
001	003	BOD5	787	1575	2.6	NULL	5.2	11-Jul-11
			3114	4143	11.3	NULL	12.3	10-Aug-11
			1216	2432	6.3	NULL	12.6	12-Sep-11
			4534	7267	13.5	NULL	20.0	11-Oct-11
			539	1079	3.8	NULL	7.5	10-Nov-11
			521	1042	2.6	NULL	5.1	9-Dec-11
			668	1335	2.8	NULL	5.6	10-Jan-12
			3225	5328	16.7	NULL	27.6	10-Feb-12
			2914	4087	13.1	NULL	18.3	12-Mar-12
			2055	2546	9.8	NULL	11.4	10-Apr-12
			965	1930	5.1	NULL	10.2	10-May-12
			<QL	<QL	<QL	NULL	<QL	11-Jun-12
			1825	1907	6.7	NULL	6.9	10-Jul-12
			428	856	2.9	NULL	5.8	10-Aug-12
			<QL	<QL	<QL	NULL	<QL	10-Sep-12
			<QL	<QL	<QL	NULL	<QL	10-Oct-12
			<QL	<QL	<QL	NULL	<QL	13-Nov-12
			<QL	<QL	<QL	NULL	<QL	10-Dec-12
			<QL	<QL	<QL	NULL	<QL	10-Jan-13
			739	1478	2.8	NULL	5.5	11-Feb-13
			1773	1979	10.1	NULL	13.8	11-Mar-13
			5014	8371	14.4	NULL	22.8	10-Apr-13
			3005	6009	12.6	NULL	25.2	10-May-13
			<QL	<QL	<QL	NULL	<QL	10-Jun-13
			<QL	<QL	<QL	NULL	<QL	10-Jul-13
			<QL	<QL	<QL	NULL	<QL	12-Aug-13
			<QL	<QL	<QL	NULL	<QL	9-Sep-13
			<QL	<QL	<QL	NULL	<QL	10-Oct-13
			719	1438	3.8	NULL	7.6	12-Nov-13
			<QL	<QL	<QL	NULL	<QL	9-Dec-13
			1367	1891	8.2	NULL	11.1	10-Jan-14
			394	787	2.6	NULL	5.2	10-Feb-14
			763	1526	3.2	NULL	6.4	10-Mar-14
			2021	2188	11.3	NULL	12.3	10-Apr-14
001	004	TSS	1252	1363	5.9	NULL	6.0	10-Jun-10
			1671	2902	8.1	NULL	14.2	12-Jul-10
			669	1104	3.2	NULL	5.4	10-Aug-10
			2286	2898	9.9	NULL	13.2	10-Sep-10
			1192	1423	6.7	NULL	8.0	12-Oct-10
			763	954	3.5	NULL	4.2	10-Nov-10
			1124	1294	6.6	NULL	7.6	10-Dec-10
			2284	3469	8.0	NULL	11.6	10-Jan-11
			2049	3456	9.9	NULL	16.6	10-Feb-11
			3612	6670	14.4	NULL	26.3	10-Mar-11
			951	1166	3.4	NULL	4.4	11-Apr-11
			965	1021	3.9	NULL	4.0	10-May-11
			2848	4360	10.8	NULL	16.0	10-Jun-11
			3240	5511	11.2	NULL	18.2	11-Jul-11
			2254	3773	7.4	NULL	11.2	10-Aug-11

Outfall Number	Parameter Code	Parameter Description	Quant Avg	Quant Max	Conc Avg	Conc Min	Conc Max	Received Date
001	004	TSS	808	1192	3.6	NULL	5.0	12-Sep-11
			4280	7376	12.5	NULL	20.3	11-Oct-11
			977	1465	6.0	NULL	8.6	10-Nov-11
			1717	2167	8.4	NULL	10.6	9-Dec-11
			866	1240	3.9	NULL	5.2	10-Jan-12
			3330	5598	17.2	NULL	29.0	10-Feb-12
			1831	1831	8.2	NULL	8.2	12-Mar-12
			1309	1653	6.2	NULL	7.4	10-Apr-12
			1824	2082	10.1	NULL	11.0	10-May-12
			1416	1581	5.7	NULL	5.8	11-Jun-12
			2239	3815	8.2	NULL	14.0	10-Jul-12
			1510	1927	7.5	NULL	7.6	10-Aug-12
			2506	4330	11.9	NULL	20.8	10-Sep-12
			1598	1942	7.8	NULL	9.0	10-Oct-12
			1010	1811	5.8	NULL	10.4	13-Nov-12
			774	1366	4.9	NULL	8.2	10-Dec-12
			1291	2083	5.7	NULL	8.6	10-Jan-13
			3831	7148	14.5	NULL	26.6	11-Feb-13
			695	1162	2.9	NULL	3.7	11-Mar-13
			5565	9362	16.0	NULL	25.5	10-Apr-13
			4906	9276	20.7	NULL	38.9	10-May-13
			764	795	4.2	NULL	5.0	10-Jun-13
			1476	2116	6.0	NULL	8.6	10-Jul-13
			718	954	3.0	NULL	4.0	12-Aug-13
			1463	1978	8.6	NULL	9.5	9-Sep-13
			2313	3720	10.1	NULL	15.6	10-Oct-13
			1137	1476	5.8	NULL	7.8	12-Nov-13
			494	613	2.6	NULL	3.0	9-Dec-13
			1712	2708	10.2	NULL	15.9	10-Jan-14
			462	484	3.1	NULL	3.2	10-Feb-14
			812	1335	3.8	NULL	5.6	10-Mar-14
			878	1174	4.9	NULL	6.6	10-Apr-14
001	007	DO	NULL	NULL	NULL	8.0	NULL	10-Jun-10
			NULL	NULL	NULL	7.3	NULL	12-Jul-10
			NULL	NULL	NULL	7.4	NULL	10-Aug-10
			NULL	NULL	NULL	7.5	NULL	10-Sep-10
			NULL	NULL	NULL	7.2	NULL	12-Oct-10
			NULL	NULL	NULL	7.7	NULL	10-Nov-10
			NULL	NULL	NULL	7.7	NULL	10-Dec-10
			NULL	NULL	NULL	8.6	NULL	10-Jan-11
			NULL	NULL	NULL	9.9	NULL	10-Feb-11
			NULL	NULL	NULL	9.1	NULL	10-Mar-11
			NULL	NULL	NULL	9.4	NULL	11-Apr-11
			NULL	NULL	NULL	8.3	NULL	10-May-11
			NULL	NULL	NULL	7.8	NULL	10-Jun-11
			NULL	NULL	NULL	7.5	NULL	11-Jul-11
			NULL	NULL	NULL	5.1	NULL	10-Aug-11
			NULL	NULL	NULL	6.9	NULL	12-Sep-11
			NULL	NULL	NULL	7.4	NULL	11-Oct-11

Outfall Number	Parameter Code	Parameter Description	Quant Avg	Quant Max	Conc Avg	Conc Min	Conc Max	Received Date
001	007	DO	NULL	NULL	NULL	6.4	NULL	10-Nov-11
			NULL	NULL	NULL	7.9	NULL	9-Dec-11
			NULL	NULL	NULL	8.3	NULL	10-Jan-12
			NULL	NULL	NULL	8.4	NULL	10-Feb-12
			NULL	NULL	NULL	7.5	NULL	12-Mar-12
			NULL	NULL	NULL	8.8	NULL	10-Apr-12
			NULL	NULL	NULL	8.8	NULL	10-May-12
			NULL	NULL	NULL	7.9	NULL	11-Jun-12
			NULL	NULL	NULL	7.4	NULL	10-Jul-12
			NULL	NULL	NULL	6.4	NULL	10-Aug-12
			NULL	NULL	NULL	7.3	NULL	10-Sep-12
			NULL	NULL	NULL	7.5	NULL	10-Oct-12
			NULL	NULL	NULL	7.9	NULL	13-Nov-12
			NULL	NULL	NULL	7.5	NULL	10-Dec-12
			NULL	NULL	NULL	8.4	NULL	10-Jan-13
			NULL	NULL	NULL	9.5	NULL	11-Feb-13
			NULL	NULL	NULL	9.5	NULL	11-Mar-13
			NULL	NULL	NULL	6.9	NULL	10-Apr-13
			NULL	NULL	NULL	7.0	NULL	10-May-13
			NULL	NULL	NULL	6.2	NULL	10-Jun-13
			NULL	NULL	NULL	5.4	NULL	10-Jul-13
			NULL	NULL	NULL	6.5	NULL	12-Aug-13
			NULL	NULL	NULL	6.8	NULL	9-Sep-13
			NULL	NULL	NULL	6.9	NULL	10-Oct-13
			NULL	NULL	NULL	6.8	NULL	12-Nov-13
			NULL	NULL	NULL	7.3	NULL	9-Dec-13
			NULL	NULL	NULL	7.4	NULL	10-Jan-14
			NULL	NULL	NULL	9.0	NULL	10-Feb-14
			NULL	NULL	NULL	8.7	NULL	10-Mar-14
			NULL	NULL	NULL	9.3	NULL	10-Apr-14
001	068	TKN (N-KJEL)	NULL	NULL	<QL	NULL	<QL	10-Jun-10
			NULL	NULL	<QL	NULL	<QL	12-Jul-10
			NULL	NULL	<QL	NULL	<QL	10-Aug-10
			NULL	NULL	<QL	NULL	<QL	10-Sep-10
			NULL	NULL	<QL	NULL	<QL	12-Oct-10
			NULL	NULL	1.23	NULL	2.45	10-Nov-10
			NULL	NULL	4.59	NULL	9.18	10-Dec-10
			NULL	NULL	10.70	NULL	10.70	10-Jan-11
			NULL	NULL	7.50	NULL	7.50	10-Feb-11
			NULL	NULL	<QL	NULL	<QL	10-Mar-11
			NULL	NULL	1.90	NULL	1.90	11-Apr-11
			NULL	NULL	<QL	NULL	<QL	10-May-11
			NULL	NULL	<QL	NULL	<QL	10-Jun-11
			NULL	NULL	<QL	NULL	<QL	11-Jul-11
			NULL	NULL	4.05	NULL	4.05	10-Aug-11
			NULL	NULL	7.82	NULL	7.82	12-Sep-11
			NULL	NULL	13.30	NULL	13.30	11-Oct-11
			NULL	NULL	<QL	NULL	<QL	10-Nov-11
			NULL	NULL	1.06	NULL	1.06	9-Dec-11
			NULL	NULL	9.10	NULL	9.10	10-Jan-12

Outfall Number	Parameter Code	Parameter Description	Quant Avg	Quant Max	Conc Avg	Conc Min	Conc Max	Received Date
001	068	TKN (N-KJEL)	NULL	NULL	10.90	NULL	10.90	10-Feb-12
			NULL	NULL	12.51	NULL	17.10	12-Mar-12
			NULL	NULL	4.93	NULL	4.93	10-Apr-12
			NULL	NULL	2.08	NULL	2.08	10-May-12
			NULL	NULL	2.42	NULL	2.42	11-Jun-12
			NULL	NULL	2.27	NULL	2.27	10-Jul-12
			NULL	NULL	<QL	NULL	<QL	10-Aug-12
			NULL	NULL	<QL	NULL	<QL	10-Sep-12
			NULL	NULL	<QL	NULL	<QL	10-Oct-12
			NULL	NULL	<QL	NULL	<QL	13-Nov-12
			NULL	NULL	<QL	NULL	<QL	10-Dec-12
			NULL	NULL	1.32	NULL	1.32	10-Jan-13
			NULL	NULL	6.10	NULL	6.10	11-Feb-13
			NULL	NULL	0.68	NULL	0.68	11-Mar-13
			NULL	NULL	9.52	NULL	9.52	10-Apr-13
			NULL	NULL	13.70	NULL	13.70	10-May-13
			NULL	NULL	1.18	NULL	1.37	10-Jun-13
			NULL	NULL	1.20	NULL	1.20	10-Jul-13
			NULL	NULL	0.86	NULL	0.86	12-Aug-13
			NULL	NULL	1.31	NULL	1.51	9-Sep-13
			NULL	NULL	0.87	NULL	0.87	10-Oct-13
			NULL	NULL	5.77	NULL	5.77	12-Nov-13
			NULL	NULL	0.88	NULL	0.88	9-Dec-13
			NULL	NULL	0.99	NULL	0.99	10-Jan-14
			NULL	NULL	0.91	NULL	1.40	10-Feb-14
			NULL	NULL	1.22	NULL	1.22	10-Mar-14
			NULL	NULL	4.18	NULL	4.18	10-Apr-14
001	120	E.COLI	NULL	NULL	6	NULL	7	10-Jun-10
			NULL	NULL	9	NULL	91	12-Jul-10
			NULL	NULL	6	NULL	17	10-Aug-10
			NULL	NULL	15	NULL	64	10-Sep-10
			NULL	NULL	12	NULL	17	12-Oct-10
			NULL	NULL	26	NULL	260	10-Nov-10
			NULL	NULL	6	NULL	20	10-Dec-10
			NULL	NULL	5	NULL	30	10-Jan-11
			NULL	NULL	2	NULL	4	10-Feb-11
			NULL	NULL	3	NULL	6	10-Mar-11
			NULL	NULL	3	NULL	17	11-Apr-11
			NULL	NULL	3	NULL	10	10-May-11
			NULL	NULL	8	NULL	15	10-Jun-11
			NULL	NULL	14	NULL	50	11-Jul-11
			NULL	NULL	26	NULL	285	10-Aug-11
			NULL	NULL	19	NULL	38	12-Sep-11
			NULL	NULL	1371	NULL	2420	11-Oct-11
			NULL	NULL	53	NULL	1203	10-Nov-11
			NULL	NULL	23	NULL	37	9-Dec-11
			NULL	NULL	9	NULL	11	10-Jan-12
			NULL	NULL	8	NULL	17	10-Feb-12
			NULL	NULL	4	NULL	8	12-Mar-12
			NULL	NULL	4	NULL	5	10-Apr-12

Outfall Number	Parameter Code	Parameter Description	Quant Avg	Quant Max	Conc Avg	Conc Min	Conc Max	Received Date
001	120	E.COLI	NULL	NULL	6	NULL	24	10-May-12
			NULL	NULL	7	NULL	17	11-Jun-12
			NULL	NULL	34	NULL	53	10-Jul-12
			NULL	NULL	13	NULL	44	10-Aug-12
			NULL	NULL	11	NULL	22	10-Sep-12
			NULL	NULL	4	NULL	20	10-Oct-12
			NULL	NULL	21	NULL	43	13-Nov-12
			NULL	NULL	17	NULL	41	10-Dec-12
			NULL	NULL	14	NULL	28	10-Jan-13
			NULL	NULL	3	NULL	10	11-Feb-13
			NULL	NULL	54	NULL	1553	11-Mar-13
			NULL	NULL	31	NULL	649	10-Apr-13
			NULL	NULL	9	NULL	87	10-May-13
			NULL	NULL	6	NULL	8	10-Jun-13
			NULL	NULL	8	NULL	19	10-Jul-13
			NULL	NULL	6	NULL	16	12-Aug-13
			NULL	NULL	12	NULL	15	9-Sep-13
			NULL	NULL	7	NULL	12	10-Oct-13
			NULL	NULL	7	NULL	19	12-Nov-13
			NULL	NULL	6	NULL	30	9-Dec-13
			NULL	NULL	4	NULL	14	10-Jan-14
			NULL	NULL	2	NULL	23	10-Feb-14
			NULL	NULL	2	NULL	3	10-Mar-14
			NULL	NULL	4	NULL	63	10-Apr-14

Attachment G3

MIX.exe Printout

Mixing Zone Predictions for Hanover Courthouse STP

Effluent Flow = 0.08 MGD
Stream 7Q10 = 33 MGD
Stream 30Q10 = 38 MGD
Stream 1Q10 = 30 MGD
Stream slope = 0.00033 ft/ft
Stream width = 75 ft
Bottom scale = 2
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.5487 ft
Length = 4992.56 ft
Velocity = .4409 ft/sec
Residence Time = .1311 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.6876 ft
Length = 4636.99 ft
Velocity = .4657 ft/sec
Residence Time = .1152 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.4616 ft
Length = 5247.25 ft
Velocity = .4248 ft/sec
Residence Time = 3.4314 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 29.14% of the 1Q10 is used.

Attachment G4

MSTRANTI and STATS.exe Printouts

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Hanover Courthouse STP　　Permit No.: VA0062154

Receiving Stream: Pamunkey River　　Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	33.7	mg/L
90% Temperature (Annual) =	25.8	deg C
90% Temperature (Wet season) =		deg C
90% Maximum pH =	7.5	SU
10% Maximum pH =	6.5	SU
Tier Designation (1 or 2) =	2	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	30	MGD
7Q10 (Annual) =	33	MGD
30Q10 (Annual) =	38	MGD
1Q10 (Wet season) =		MGD
30Q10 (Wet season) =		MGD
30Q5 =	48	MGD
Harmonic Mean =	183	MGD
Annual Average =	N/A	MGD

Mixing Information

Annual - 1Q10 Mix =	29.1	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =		%
- 30Q10 Mix =		%

Effluent Information

Mean Hardness (as CaCO3) =	92.6	mg/L
90% Temp (Annual) =	25.9	deg C
90% Temp (Wet season) =		deg C
90% Maximum pH =	7.84	SU
10% Maximum pH =	7.4	SU
Discharge Flow =	0.08	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	2.7E+03	--	--	na	1.6E+06	--	--	na	2.7E+02	--	--	na	1.6E+05	**--**	**--**	**na**	**1.6E+05**
Acrolein	0	--	--	na	7.8E+02	--	--	na	4.7E+05	--	--	na	7.8E+01	--	--	na	4.7E+04	**--**	**--**	**na**	**4.7E+04**
Acrylonitrile[C]	0	--	--	na	6.6E+00	--	--	na	1.5E+04	--	--	na	6.6E-01	--	--	na	1.5E+03	**--**	**--**	**na**	**1.5E+03**
Aldrin [C]	0	3.0E+00	--	na	1.4E-03	3.3E+02	--	na	3.2E+00	7.5E-01	--	na	1.4E-04	2.8E+02	--	na	3.2E-01	**2.8E+02**	**--**	**na**	**3.2E-01**
Ammonia-N (mg/l) (Yearly)	0	1.98E+01	2.11E+00	na	--	2.2E+03	1.0E+03	na	--	4.97E+00	5.27E-01	na	--	1.9E+03	2.5E+02	na	--	**1.9E+03**	**2.5E+02**	**na**	**--**
Ammonia-N (mg/l) (High Flow)	0	1.13E+01	3.03E+00	na	--	1.1E+01	3.0E+00	na	--	2.83E+00	7.57E-01	na	--	2.8E+00	7.6E-01	na	--	**2.8E+00**	**7.6E-01**	**na**	**--**
Anthracene	0	--	--	na	1.1E+05	--	--	na	6.6E+07	--	--	na	1.1E+04	--	--	na	6.6E+06	**--**	**--**	**na**	**6.6E+06**
Antimony	0	--	--	na	4.3E+03	--	--	na	2.6E+06	--	--	na	4.3E+02	--	--	na	2.6E+05	**--**	**--**	**na**	**2.6E+05**
Arsenic	o	3.4E+02	1.5E+02	na	--	3.7E+04	6.2E+04	na	--	8.5E+01	3.8E+01	na	--	3.2E+04	1.6E+04	na	--	**3.2E+04**	**1.6E+04**	**na**	**--**
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Benzene [C]	0	--	--	na	7.1E+02	--	--	na	1.6E+06	--	--	na	7.1E+01	--	--	na	1.6E+05	**--**	**--**	**na**	**1.6E+05**
Benzidine[C]	0	--	--	na	5.4E-03	--	--	na	1.2E+01	--	--	na	5.4E-04	--	--	na	1.2E+00	**--**	**--**	**na**	**1.2E+00**
Benzo (a) anthracene [C]	0	--	--	na	4.9E-01	--	--	na	1.1E+03	--	--	na	4.9E-02	--	--	na	1.1E+02	**--**	**--**	**na**	**1.1E+02**
Benzo (b) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	1.1E+03	--	--	na	4.9E-02	--	--	na	1.1E+02	**--**	**--**	**na**	**1.1E+02**
Benzo (k) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	1.1E+03	--	--	na	4.9E-02	--	--	na	1.1E+02	**--**	**--**	**na**	**1.1E+02**
Benzo (a) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	1.1E+03	--	--	na	4.9E-02	--	--	na	1.1E+02	**--**	**--**	**na**	**1.1E+02**
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	8.4E+03	--	--	na	1.4E+00	--	--	na	8.4E+02	**--**	**--**	**na**	**8.4E+02**
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	1.0E+08	--	--	na	1.7E+04	--	--	na	1.0E+07	**--**	**--**	**na**	**1.0E+07**
Bromoform [C]	0	--	--	na	3.6E+03	--	--	na	8.2E+06	--	--	na	3.6E+02	--	--	na	8.2E+05	**--**	**--**	**na**	**8.2E+05**
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	3.1E+06	--	--	na	5.2E+02	--	--	na	3.1E+05	**--**	**--**	**na**	**3.1E+05**
Cadmium	0	1.2E+00	4.8E-01	na	--	1.3E+02	2.0E+02	na	--	2.9E-01	1.2E-01	na	--	1.1E+02	5.0E+01	na	--	**1.1E+02**	**5.0E+01**	**na**	**--**
Carbon Tetrachloride [C]	0	--	--	na	4.4E+01	--	--	na	1.0E+05	--	--	na	4.4E+00	--	--	na	1.0E+04	**--**	**--**	**na**	**1.0E+04**
Chlordane [C]	0	2.4E+00	4.3E-03	na	2.2E-02	2.6E+02	1.8E+00	na	5.0E+01	6.0E-01	1.1E-03	na	2.2E-03	2.3E+02	4.4E-01	na	5.0E+00	**2.3E+02**	**4.4E-01**	**na**	**5.0E+00**
Chloride	0	8.6E+05	2.3E+05	na	--	9.5E+07	9.5E+07	na	--	2.2E+05	5.8E+04	na	--	8.1E+07	2.4E+07	na	--	**8.1E+07**	**2.4E+07**	**na**	**--**
TRC	0	1.9E+01	1.1E+01	na	--	2.1E+03	4.5E+03	na	--	4.8E+00	2.8E+00	na	--	1.8E+03	1.1E+03	na	--	**1.8E+03**	**1.1E+03**	**na**	**--**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	1.3E+07	--	--	na	2.1E+03	--	--	na	1.3E+06	**--**	**--**	**na**	**1.3E+06**
Chlorodibromomethane[C]	0	--	--	na	3.4E+02	--	--	na	7.8E+05	--	--	na	3.4E+01	--	--	na	7.8E+04	**--**	**--**	**na**	**7.8E+04**
Chloroform[C]	0	--	--	na	2.9E+04	--	--	na	6.6E+07	--	--	na	2.9E+03	--	--	na	6.6E+06	**--**	**--**	**na**	**6.6E+06**
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	2.6E+06	--	--	na	4.3E+02	--	--	na	2.6E+05	**--**	**--**	**na**	**2.6E+05**
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	2.4E+05	--	--	na	4.0E+01	--	--	na	2.4E+04	**--**	**--**	**na**	**2.4E+04**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	9.1E+00	1.7E+01	na	--	2.1E-02	1.0E-02	na	--	7.8E+00	4.2E+00	na	--	**7.8E+00**	**4.2E+00**	**na**	**--**
Chromium III	0	2.4E+02	3.1E+01	na	--	2.6E+04	1.3E+04	na	--	5.9E+01	7.6E+00	na	--	2.2E+04	3.2E+03	na	--	**2.2E+04**	**3.2E+03**	**na**	**--**
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.8E+03	4.5E+03	na	--	4.0E+00	2.8E+00	na	--	1.5E+03	1.1E+03	na	--	**1.5E+03**	**1.1E+03**	**na**	**--**
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Chrysene[C]	0	--	--	na	4.9E-01	--	--	na	1.1E+03	--	--	na	4.9E-02	--	--	na	1.1E+02	**--**	**--**	**na**	**1.1E+02**
Copper	0	4.9E+00	3.5E+00	na	--	5.4E+02	1.5E+03	na	--	1.2E+00	8.9E-01	na	--	4.6E+02	3.7E+02	na	--	**4.6E+02**	**3.7E+02**	**na**	**--**
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	2.4E+03	2.2E+03	na	1.3E+08	5.5E+00	1.3E+00	na	2.2E+04	2.1E+03	5.4E+02	na	1.3E+07	**2.1E+03**	**5.4E+02**	**na**	**1.3E+07**
DDD[C]	0	--	--	na	8.4E-03	--	--	na	1.9E+01	--	--	na	8.4E-04	--	--	na	1.9E+00	**--**	**--**	**na**	**1.9E+00**
DDE[C]	0	--	--	na	5.9E-03	--	--	na	1.4E+01	--	--	na	5.9E-04	--	--	na	1.4E+00	**--**	**--**	**na**	**1.4E+00**
DDT[C]	0	1.1E+00	1.0E-03	na	5.9E-03	1.2E+02	4.1E-01	na	1.4E+01	2.8E-01	2.5E-04	na	5.9E-04	1.0E+02	1.0E-01	na	1.4E+00	**1.0E+02**	**1.0E-01**	**na**	**1.4E+00**
Demeton	0	--	1.0E-01	na	--	--	4.1E+01	na	--	--	2.5E-02	na	--	--	1.0E+01	na	--	**--**	**1.0E+01**	**na**	**--**
Dibenz(a,h)anthracene[C]	0	--	--	na	4.9E-01	--	--	na	1.1E+03	--	--	na	4.9E-02	--	--	na	1.1E+02	**--**	**--**	**na**	**1.1E+02**
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	7.2E+06	--	--	na	1.2E+03	--	--	na	7.2E+05	**--**	**--**	**na**	**7.2E+05**
Dichloromethane (Methylene Chloride)[C]	0	--	--	na	1.6E+04	--	--	na	3.7E+07	--	--	na	1.6E+03	--	--	na	3.7E+06	**--**	**--**	**na**	**3.7E+06**
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	1.0E+07	--	--	na	1.7E+03	--	--	na	1.0E+06	**--**	**--**	**na**	**1.0E+06**
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	1.6E+06	--	--	na	2.6E+02	--	--	na	1.6E+05	**--**	**--**	**na**	**1.6E+05**
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	1.6E+06	--	--	na	2.6E+02	--	--	na	1.6E+05	**--**	**--**	**na**	**1.6E+05**
3,3-Dichlorobenzidine[C]	0	--	--	na	7.7E-01	--	--	na	1.8E+03	--	--	na	7.7E-02	--	--	na	1.8E+02	**--**	**--**	**na**	**1.8E+02**
Dichlorobromomethane[C]	0	--	--	na	4.6E+02	--	--	na	1.1E+06	--	--	na	4.6E+01	--	--	na	1.1E+05	**--**	**--**	**na**	**1.1E+05**
1,2-Dichloroethane[C]	0	--	--	na	9.9E+02	--	--	na	2.3E+06	--	--	na	9.9E+01	--	--	na	2.3E+05	**--**	**--**	**na**	**2.3E+05**
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	1.0E+07	--	--	na	1.7E+03	--	--	na	1.0E+06	**--**	**--**	**na**	**1.0E+06**
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	8.4E+07	--	--	na	1.4E+04	--	--	na	8.4E+06	**--**	**--**	**na**	**8.4E+06**
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	4.7E+05	--	--	na	7.9E+01	--	--	na	4.7E+04	**--**	**--**	**na**	**4.7E+04**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,2-Dichloropropane[C]	0	--	--	na	3.9E+02	--	--	na	8.9E+05	--	--	na	3.9E+01	--	--	na	8.9E+04	**--**	**--**	**na**	**8.9E+04**
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	1.0E+06	--	--	na	1.7E+02	--	--	na	1.0E+05	**--**	**--**	**na**	**1.0E+05**
Dieldrin[C]	0	2.4E-01	5.6E-02	na	1.4E-03	2.6E+01	2.3E+01	na	3.2E+00	6.0E-02	1.4E-02	na	1.4E-04	2.3E+01	5.8E+00	na	3.2E-01	**2.3E+01**	**5.8E+00**	**na**	**3.2E-01**
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	7.2E+07	--	--	na	1.2E+04	--	--	na	7.2E+06	**--**	**--**	**na**	**7.2E+06**
Di-2-Ethylhexyl Phthalate[C]	0	--	--	na	5.9E+01	--	--	na	1.4E+05	--	--	na	5.9E+00	--	--	na	1.4E+04	**--**	**--**	**na**	**1.4E+04**
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	1.4E+06	--	--	na	2.3E+02	--	--	na	1.4E+05	**--**	**--**	**na**	**1.4E+05**
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	1.7E+09	--	--	na	2.9E+05	--	--	na	1.7E+08	**--**	**--**	**na**	**1.7E+08**
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	7.2E+06	--	--	na	1.2E+03	--	--	na	7.2E+05	**--**	**--**	**na**	**7.2E+05**
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	8.4E+06	--	--	na	1.4E+03	--	--	na	8.4E+05	**--**	**--**	**na**	**8.4E+05**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	4.6E+05	--	--	na	7.7E+01	--	--	na	4.6E+04	**--**	**--**	**na**	**4.6E+04**
2,4-Dinitrotoluene[C]	0	--	--	na	9.1E+01	--	--	na	2.1E+05	--	--	na	9.1E+00	--	--	na	2.1E+04	**--**	**--**	**na**	**2.1E+04**
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	na	1.2E-07	--	--	na	1.2E-07	**--**	**--**	**na**	**na**
1,2-Diphenylhydrazine[C]	0	--	--	na	5.4E+00	--	--	na	1.2E+04	--	--	na	5.4E-01	--	--	na	1.2E+03	**--**	**--**	**na**	**1.2E+03**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.4E+01	2.3E+01	na	1.4E+05	5.5E-02	1.4E-02	na	2.4E+01	2.1E+01	5.8E+00	na	1.4E+04	**2.1E+01**	**5.8E+00**	**na**	**1.4E+04**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.4E+01	2.3E+01	na	1.4E+05	5.5E-02	1.4E-02	na	2.4E+01	2.1E+01	5.8E+00	na	1.4E+04	**2.1E+01**	**5.8E+00**	**na**	**1.4E+04**
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	1.4E+05	--	--	na	2.4E+01	--	--	na	1.4E+04	**--**	**--**	**na**	**1.4E+04**
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	9.5E+00	1.5E+01	na	4.9E+02	2.2E-02	9.0E-03	na	8.1E-02	8.1E+00	3.7E+00	na	4.9E+01	**8.1E+00**	**3.7E+00**	**na**	**4.9E+01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	4.9E+02	--	--	na	8.1E-02	--	--	na	4.9E+01	**--**	**--**	**na**	**4.9E+01**
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	1.7E+07	--	--	na	2.9E+03	--	--	na	1.7E+06	**--**	**--**	**na**	**1.7E+06**
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	2.2E+05	--	--	na	3.7E+01	--	--	na	2.2E+04	**--**	**--**	**na**	**2.2E+04**
Fluorene	0	--	--	na	1.4E+04	--	--	na	8.4E+06	--	--	na	1.4E+03	--	--	na	8.4E+05	**--**	**--**	**na**	**8.4E+05**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Guthion	0	--	1.0E-02	na	--	--	4.1E+00	na	--	--	2.5E-03	na	--	--	1.0E+00	na	--	**--**	**1.0E+00**	**na**	**--**
Heptachlor [C]	0	5.2E-01	3.8E-03	na	2.1E-03	5.7E+01	1.6E+00	na	4.8E+00	1.3E-01	9.5E-04	na	2.1E-04	4.9E+01	3.9E-01	na	4.8E-01	**4.9E+01**	**3.9E-01**	**na**	**4.8E-01**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	1.1E-03	5.7E+01	1.6E+00	na	2.5E+00	1.3E-01	9.5E-04	na	1.1E-04	4.9E+01	3.9E-01	na	2.5E-01	**4.9E+01**	**3.9E-01**	**na**	**2.5E-01**
Hexachlorobenzene[C]	0	--	--	na	7.7E-03	--	--	na	1.8E+01	--	--	na	7.7E-04	--	--	na	1.8E+00	**--**	**--**	**na**	**1.8E+00**
Hexachlorobutadiene[C]	0	--	--	na	5.0E+02	--	--	na	1.1E+06	--	--	na	5.0E+01	--	--	na	1.1E+05	**--**	**--**	**na**	**1.1E+05**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	1.3E-01	--	--	na	3.0E+02	--	--	na	1.3E-02	--	--	na	3.0E+01	**--**	**--**	**na**	**3.0E+01**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	4.6E-01	--	--	na	1.1E+03	--	--	na	4.6E-02	--	--	na	1.1E+02	**--**	**--**	**na**	**1.1E+02**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	6.3E-01	1.0E+02	--	na	1.4E+03	2.4E-01	--	na	6.3E-02	8.9E+01	--	na	1.4E+02	**8.9E+01**	**--**	**na**	**1.4E+02**
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	1.0E+07	--	--	na	1.7E+03	--	--	na	1.0E+06	**--**	**--**	**na**	**1.0E+06**
Hexachloroethane[C]	0	--	--	na	8.9E+01	--	--	na	2.0E+05	--	--	na	8.9E+00	--	--	na	2.0E+04	**--**	**--**	**na**	**2.0E+04**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	8.3E+02	na	--	--	5.0E-01	na	--	--	2.1E+02	na	--	**--**	**2.1E+02**	**na**	**--**
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	1.1E+03	--	--	na	4.9E-02	--	--	na	1.1E+02	**--**	**--**	**na**	**1.1E+02**
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Isophorone[C]	0	--	--	na	2.6E+04	--	--	na	6.0E+07	--	--	na	2.6E+03	--	--	na	6.0E+06	**--**	**--**	**na**	**6.0E+06**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	**--**	**0.0E+00**	**na**	**--**
Lead	0	3.0E+01	3.4E+00	na	--	3.3E+03	1.4E+03	na	--	7.5E+00	8.5E-01	na	--	2.8E+03	3.5E+02	na	--	**2.8E+03**	**3.5E+02**	**na**	**--**
Malathion	0	--	1.0E-01	na	--	--	4.1E+01	na	--	--	2.5E-02	na	--	--	1.0E+01	na	--	**--**	**1.0E+01**	**na**	**--**
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	1.5E+02	3.2E+02	na	3.1E+01	3.5E-01	1.9E-01	na	5.1E-03	1.3E+02	8.0E+01	na	3.1E+00	**1.3E+02**	**8.0E+01**	**na**	**3.1E+00**
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	2.4E+06	--	--	na	4.0E+02	--	--	na	2.4E+05	**--**	**--**	**na**	**2.4E+05**
Methoxychlor	0	--	3.0E-02	na	--	--	1.2E+01	na	--	--	7.5E-03	na	--	--	3.1E+00	na	--	**--**	**3.1E+00**	**na**	**--**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	**--**	**0.0E+00**	**na**	**--**
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	1.3E+07	--	--	na	2.1E+03	--	--	na	1.3E+06	**--**	**--**	**na**	**1.3E+06**
Nickel	0	7.4E+01	8.1E+00	na	4.6E+03	8.1E+03	3.4E+03	na	2.8E+06	1.8E+01	2.0E+00	na	4.6E+02	6.9E+03	8.4E+02	na	2.8E+05	**6.9E+03**	**8.4E+02**	**na**	**2.8E+05**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	1.1E+06	--	--	na	1.9E+02	--	--	na	1.1E+05	**--**	**--**	**na**	**1.1E+05**
N-Nitrosodimethylamine[C]	0	--	--	na	8.1E+01	--	--	na	1.9E+05	--	--	na	8.1E+00	--	--	na	1.9E+04	**--**	**--**	**na**	**1.9E+04**
N-Nitrosodiphenylamine[C]	0	--	--	na	1.6E+02	--	--	na	3.7E+05	--	--	na	1.6E+01	--	--	na	3.7E+04	**--**	**--**	**na**	**3.7E+04**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	1.4E+01	--	--	na	3.2E+04	--	--	na	1.4E+00	--	--	na	3.2E+03	**--**	**--**	**na**	**3.2E+03**
Parathion	0	6.5E-02	1.3E-02	na	--	7.2E+00	5.4E+00	na	--	1.6E-02	3.3E-03	na	--	6.1E+00	1.3E+00	na	--	**6.1E+00**	**1.3E+00**	**na**	**--**
PCB-1016	0	--	1.4E-02	na	--	--	5.8E+00	na	--	--	3.5E-03	na	--	--	1.4E+00	na	--	**--**	**1.4E+00**	**na**	**--**
PCB-1221	0	--	1.4E-02	na	--	--	5.8E+00	na	--	--	3.5E-03	na	--	--	1.4E+00	na	--	**--**	**1.4E+00**	**na**	**--**
PCB-1232	0	--	1.4E-02	na	--	--	5.8E+00	na	--	--	3.5E-03	na	--	--	1.4E+00	na	--	**--**	**1.4E+00**	**na**	**--**
PCB-1242	0	--	1.4E-02	na	--	--	5.8E+00	na	--	--	3.5E-03	na	--	--	1.4E+00	na	--	**--**	**1.4E+00**	**na**	**--**
PCB-1248	0	--	1.4E-02	na	--	--	5.8E+00	na	--	--	3.5E-03	na	--	--	1.4E+00	na	--	**--**	**1.4E+00**	**na**	**--**
PCB-1254	0	--	1.4E-02	na	--	--	5.8E+00	na	--	--	3.5E-03	na	--	--	1.4E+00	na	--	**--**	**1.4E+00**	**na**	**--**
PCB-1260	0	--	1.4E-02	na	--	--	5.8E+00	na	--	--	3.5E-03	na	--	--	1.4E+00	na	--	**--**	**1.4E+00**	**na**	**--**
PCB Total[C]	0	--	--	na	1.7E-03	--	--	na	3.9E+00	--	--	na	1.7E-04	--	--	na	3.9E-01	**--**	**--**	**na**	**3.9E-01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Pentachlorophenol [C]	0	5.3E+00	4.1E+00	na	8.2E+01	5.8E+02	1.7E+03	na	1.9E+05	1.3E+00	1.0E+00	na	8.2E+00	5.0E+02	4.2E+02	na	1.9E+04	**5.0E+02**	**4.2E+02**	**na**	**1.9E+04**
Phenol	0	--	--	na	4.6E+06	--	--	na	2.8E+09	--	--	na	4.6E+05	--	--	na	2.8E+08	**--**	**--**	**na**	**2.8E+08**
Pyrene	0	--	--	na	1.1E+04	--	--	na	6.6E+06	--	--	na	1.1E+03	--	--	na	6.6E+05	**--**	**--**	**na**	**6.6E+05**
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	9.0E+03	--	--	na	1.5E+00	--	--	na	9.0E+02	**--**	**--**	**na**	**9.0E+02**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	2.4E+03	--	--	na	4.0E-01	--	--	na	2.4E+02	**--**	**--**	**na**	**2.4E+02**
Strontium-90	0	--	--	na	8.0E+00	--	--	na	4.8E+03	--	--	na	8.0E-01	--	--	na	4.8E+02	**--**	**--**	**na**	**4.8E+02**
Tritium	0	--	--	na	2.0E+04	--	--	na	1.2E+07	--	--	na	2.0E+03	--	--	na	1.2E+06	**--**	**--**	**na**	**1.2E+06**
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	2.2E+03	2.1E+03	na	6.6E+06	5.0E+00	1.3E+00	na	1.1E+03	1.9E+03	5.2E+02	na	6.6E+05	**1.9E+03**	**5.2E+02**	**na**	**6.6E+05**
Silver	0	5.5E-01	--	na	--	6.0E+01	--	na	--	1.3E-01	--	na	--	5.0E+01	--	na	--	**5.0E+01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane [C]	0	--	--	na	1.1E+02	--	--	na	2.5E+05	--	--	na	1.1E+01	--	--	na	2.5E+04	**--**	**--**	**na**	**2.5E+04**
Tetrachloroethylene [C]	0	--	--	na	8.9E+01	--	--	na	2.0E+05	--	--	na	8.9E+00	--	--	na	2.0E+04	**--**	**--**	**na**	**2.0E+04**
Thallium	0	--	--	na	6.3E+00	--	--	na	3.8E+03	--	--	na	6.3E-01	--	--	na	3.8E+02	**--**	**--**	**na**	**3.8E+02**
Toluene	0	--	--	na	2.0E+05	--	--	na	1.2E+08	--	--	na	2.0E+04	--	--	na	1.2E+07	**--**	**--**	**na**	**1.2E+07**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	7.5E-03	8.0E+01	8.3E-02	na	1.7E+01	1.8E-01	5.0E-05	na	7.5E-04	6.9E+01	2.1E-02	na	1.7E+00	**6.9E+01**	**2.1E-02**	**na**	**1.7E+00**
Tributyltin	0	4.6E-01	6.3E-02	na	--	5.1E+01	2.6E+01	na	--	1.2E-01	1.6E-02	na	--	4.3E+01	6.5E+00	na	--	**4.3E+01**	**6.5E+00**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	5.6E+05	--	--	na	9.4E+01	--	--	na	5.6E+04	**--**	**--**	**na**	**5.6E+04**
1,1,2-Trichloroethane [C]	0	--	--	na	4.2E+02	--	--	na	9.6E+05	--	--	na	4.2E+01	--	--	na	9.6E+04	**--**	**--**	**na**	**9.6E+04**
Trichloroethylene [C]	0	--	--	na	8.1E+02	--	--	na	1.9E+06	--	--	na	8.1E+01	--	--	na	1.9E+05	**--**	**--**	**na**	**1.9E+05**
2,4,6-Trichlorophenol [C]	0	--	--	na	6.5E+01	--	--	na	1.5E+05	--	--	na	6.5E+00	--	--	na	1.5E+04	**--**	**--**	**na**	**1.5E+04**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride [C]	0	--	--	na	6.1E+01	--	--	na	1.4E+05	--	--	na	6.1E+00	--	--	na	1.4E+04	**--**	**--**	**na**	**1.4E+04**
Zinc	0	4.7E+01	4.7E+01	na	6.9E+04	5.2E+03	2.0E+04	na	4.1E+07	1.2E+01	1.2E+01	na	6.9E+03	4.4E+03	4.9E+03	na	4.1E+06	**4.4E+03**	**4.9E+03**	**na**	**4.1E+06**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens,
   Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	2.6E+05
Arsenic	9.3E+03
Barium	na
Cadmium	3.0E+01
Chromium III	1.9E+03
Chromium VI	6.0E+02
Copper	1.8E+02
Iron	na
Lead	2.1E+02
Manganese	na
Mercury	3.1E+00
Nickel	5.0E+02
Selenium	3.1E+02
Silver	2.0E+01
Zinc	1.8E+03

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Facility = Hanover Courthouse STP
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 1900
WLAc = 250
Q.L. = 1
# samples/mo. = 2
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 17
Variance = 104.04
C.V. = 0.6
97th percentile daily values = 41.3680
97th percentile 4 day average = 28.2844
97th percentile 30 day average= 20.5029
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
17

Facility = Hanover Courthouse STP

Chemical = chloride

Chronic averaging period = 4

WLAa = 81000000

WLAc = 24000000

Q.L. = 5

samples/mo. = 1

samples/wk. = 1

Summary of Statistics:

observations = 1

Expected Value = 56000

Variance = 1128960

C.V. = 0.6

97th percentile daily values = 136271.

97th percentile 4 day average = 93172.2

97th percentile 30 day average= 67538.9

< Q.L. = 0

Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

56000

Attachment H

Stream Sanitation Analysis Memoranda

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office
4949-A Cox Road Glen Allen, Virginia 23060

SUBJECT: **Stream Sanitation Analysis – Pamunkey River**
Hanover Courthouse STP – VA0062154

TO: Ray Jenkins

FROM: Jennifer Palmore, P.G. JW

DATE: May 1, 2009

COPIES: File, Curt Linderman

A request for a stream sanitation analysis for the Hanover Courthouse Sewage Treatment Plant (STP) was received on April 17, 2009. The facility discharges via Outfall 001 to the Pamunkey River near Hanover, VA. The discharge is located at rivermile 8-PMK088.63, approximately 0.5 mile upstream of the Route 301 bridge. The facility is currently permitted to discharge 0.08 MGD, but is requesting an expansion to 0.09 MGD. The expansion will be achieved by re-rating the existing plant, rather than by new construction.

Background

At Hanover Courthouse, the Pamunkey River is influenced by the combined Doswell STP/Bear Island Paper Company (BIPCO) discharge which is located on the North Anna River at rivermile 8-NAR003.55. The North Anna River joins the South Anna River to form the Pamunkey River six miles upstream of the Hanover Courthouse discharge. The Doswell STP/BIPCO discharge is permitted under VA0029521 – Doswell STP. Although Hanover County is the permittee, the majority of the flow originates from the BIPCO facility.

The Doswell STP discharge has been modeled several times. Development of the permit limits for the current North Anna discharge is outlined in a 1988 modeling report by HDR Infrastructure. This report summarizes several modeling efforts (1973, 1978, and 1985) as well as performing a new model (1987) for a proposed discharge expansion. The "previous" condition in the report is a combined discharge of 2.5 MGD (1.0 MGD Doswell municipal effluent and 1.5 MGD BIPCO effluent; the previous modeling defined the allowable $cBOD_5$ effluent limit through an equation based on the flow of the North Anna River. In the 1987 modeling effort, HDR determined that if the discharge is 4.5 MGD with 690 lb/d $cBOD_5$, it is necessary to oxygenate the effluent; at summer 7Q10 conditions an instream mix of 12.65 mg/L is needed in order to maintain a minimum DO of 5.77 mg/L in the North Anna (see HDR report Section 7.4.2). The model outlined various seasonal scenarios which were considered acceptable at the time of development. The summer scenarios are as follows: 1) when discharging 4.5 MGD and 690 lb/d $cBOD_5$ the effluent must be supersaturated at 7Q10 conditions (41.91 cfs); 2) when discharging 5.4 MGD and 1351 lb/d $cBOD_5$, stream flows must exceed 97.7 cfs and upstream dissolved oxygen be at least 7.73 mg/L before supplemental aeration can be turned off; and 3) when discharging the hydrograph-controlled lagoon at 21.2 MGD and 5300 lb/d $cBOD_5$, supplemental aeration is not needed if stream flows exceed 222.7 cfs and upstream dissolved oxygen is at least 7.73 mg/L. Although the current VPDES permit allows a daily average flow of 5.2 MGD (4.2 MGD average for BIPCO and 1.0 MGD for Doswell), the current limits are still based on the old equation and the oxygenation requirements are not yet in effect. Note: The fact sheet for the draft 2009 VPDES permit for the Doswell STP requires the discharge to be remodeled within the next 5 years.

Hanover Courthouse Modeling Approach

Regional Model 4.11 was chosen to model the Hanover Courthouse discharge. The Regional Model utilizes the Streeter-Phelps equation and is appropriate for use in free-flowing streams with defined channels and steady-state conditions. The modeled segment begins at the discharge and extends downstream six miles to Norman Bridge (rivermile 82.34).

The Regional Model was initially run without the Hanover Courthouse discharge to set the background condition. It was then remodeled with the Hanover Courthouse flow and the two results were compared to ensure that antidegradation will be maintained at all locations in the segment (<0.2 mg/L drop in dissolved oxygen from background conditions.)

Due to the complexities of the Doswell permit, which relies on the flow-based equation, as well as the difficulty establishing the downstream condition because the current effluent flow does not match the flows used in the HDR model, I did not attempt to input the Doswell discharge into the Regional Model. This is not ideal because antidegradation is implemented cumulatively across all permits, in other words the deficit from the Doswell/BIPCO and Hanover Courthouse discharges combined cannot exceed a 0.2 mg/L drop. This current model in effect gives the entire antidegradation allocation to Hanover Courthouse. This will be revised, if necessary, when the Dos well/BIPCO discharge is remodeled.

Although the Doswell discharge was excluded, I did attempt to tie the models together. The HDR model results were used to determine the background river water quality at the Hanover Courthouse outfall. HDR modeled the critical summer condition with a discharge flow of 0.0 MGD to establish the background condition. At the location of the Hanover Courthouse discharge, the model output indicated an instream $cBOD_U$ of 3.27 mg/L, TKN of 0.31 mg/L, and DO of 6.23 mg/L. The TKN and DO results were directly input into the Regional Model. The $cBOD_U$ equates to a $cBOD_5$ of 1.31 mg/L, assuming a $cBOD_5/cBOD_U$ ratio of 2.5, which is the default assumption in the Regional Model. However, the Regional Model requires a minimum background $cBOD_5$ of 2 mg/L, which was used in the model.

The channel width, depth, and velocity were obtained from a 1999 Conceptual Engineering Report submitted by BIPCO and prepared by AWARE Environmental. The AWARE model addressed a proposal by BIPCO to separate their discharge from Doswell and relocate their outfall directly to the Pamunkey River.

The model uses a 7Q10 stream flow of 52 cfs from my 4/20/2009 flow frequency determination. Data from station 8-PMK082.34 were used to calculate the 90th percentile temperature.

Note: Hanover Courthouse STP was last modeled in 1994 by D.X. Ren using Regional Model 3.2. Although he also used the BIPCO model's summer 7Q10 results to set the instream water quality background conditions at Hanover Courthouse, my model differs in one approach; I used the zero MGD background condition results, however Ren's model includes the Doswell discharge. I did not use this approach for several reasons: 1) as stated above, the modeled scenarios do not match the current flows and permit limits (equation), and 2) the antidegradation policy was applied to the entire model and was not applied at each location. For instance, at the Hanover outfall the 4.5 MGD model allowed a DO of 5.70 mg/L, which is well below the modeled background condition of 6.23 mg/L. This exceeds the allowable 0.2 mg/L drop at that location. The HDR model ran the background condition and determined that the lowest DO in any segment would be 5.97 mg/L. The model was then run until the lowest DO in any segment was above 5.77 mg/L. They did not compare each location to its expected background DO.

Results

The Regional Model results indicate that the antidegradation policy will be maintained if Hanover Courthouse STP discharges 0.09 MGD at technology-based limits and a dissolved oxygen limit of 5.0 mg/L. The maximum dissolved oxygen deficit that will be expected is 0.171 mg/L at 0.3 mile downstream of the discharge. The model documentation is attached.

If you have any questions, please let me know.

REFERENCES

1 "Water Quality Modeling, North Anna and Pamunkey River, York River Basin, Virginia", HDR Infrastructure, Inc., HDR Project 317-10-35, January 1988

2 "Conceptual Engineering Report in Support of Bear Island Paper Company, L.L.C., VPDES Permit Application, Ashland, Virginia", AWARE Environmental, Inc., AEI Job N106-17, Revised March 1999

3 "Proposed Effluent Limits for Hanover Courthouse STP (VA0062154)", DEQ memorandum from D.X. Ren to Curt Linderman, April 25, 1994

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge
to PAMUNKEY RIVER.

File Information

File Name:	C:\Documents and Settings\jvpalmore\My Documents\models\Hanover Cou
Date Modified:	May 01, 2009

Water Quality Standards Information

Stream Name:	PAMUNKEY RIVER
River Basin:	York River Basin
Section:	3
Class:	III - Nontidal Waters (Coastal and Piedmont)
Special Standards:	None

Background Flow Information

Gauge Used:	#01653000 Pamunkey River near Hanover, VA
Gauge Drainage Area:	1081 Sq.Mi.
Gauge 7Q10 Flow:	33.6 MGD
Headwater Drainage Area:	1073 Sq.Mi.
Headwater 7Q10 Flow:	33.35134 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges:	0 MGD
Incremental Flow in Segments:	3.108233E-02 MGD/Sq.Mi.

Background Water Quality

Background Temperature:	25.3 Degrees C
Background cBOD5:	2 mg/l
Background TKN:	0.31 mg/l
Background D.O.:	6.23 mg/l

Model Segmentation

Number of Segments:	2
Model Start Elevation:	28.9 ft above MSL
Model End Elevation:	23.7 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge to PAMUNKEY RIVER.

Segment Information for Segment 1

Definition Information	
Segment Definition:	A discharge enters.
Discharge Name:	HANOVER COURTHOUSE STP
VPDES Permit No.:	
Discharger Flow Information	
Flow:	0 MGD
cBOD5:	25 mg/l
TKN:	20 mg/l
D.O.:	5 mg/l
Temperature:	25.3 Degrees C
Geographic Information	
Segment Length:	0.63 miles
Upstream Drainage Area:	1073 Sq.Mi.
Downstream Drainage Area:	1074 Sq.Mi.
Upstream Elevation:	28.9 Ft.
Downstream Elevation:	28.4 Ft.
Hydraulic Information	
Segment Width:	103.245 Ft.
Segment Depth:	1.696 Ft.
Segment Velocity:	0.349 Ft./Sec.
Segment Flow:	33.351 MGD
Incremental Flow:	0.031 MGD (Applied at end of segment.)
Channel Information	
Cross Section:	Rectangular
Character:	Mostly Straight
Pool and Riffle:	No
Bottom Type:	Sand
Sludge:	None
Plants:	None
Algae:	None

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge to PAMUNKEY RIVER.

Segment Information for Segment 2

Definition Information	
Segment Definition:	A significant change occurs.
Geographic Information	
Segment Length:	5.37 miles
Upstream Drainage Area:	1074 Sq.Mi.
Downstream Drainage Area:	1081 Sq.Mi.
Upstream Elevation:	28.4 Ft.
Downstream Elevation:	23.7 Ft.
Hydraulic Information	
Segment Width:	65.955 Ft.
Segment Depth:	1.696 Ft.
Segment Velocity:	0.547 Ft./Sec.
Segment Flow:	33.351 MGD
Incremental Flow:	0.218 MGD (Applied at end of segment.)
Channel Information	
Cross Section:	Rectangular
Character:	Mostly Straight
Pool and Riffle:	No
Bottom Type:	Sand
Sludge:	None
Plants:	None
Algae:	None

```
"Model Run For C:\Documents and Settings\jvpalmore\My Documents\models\Hanover
Courthouse 2009 background - 2 segs w BIPCO stats.mod On 5/1/2009 9:19:56 AM"

"Model is for PAMUNKEY RIVER."
"Model starts at the HANOVER COURTHOUSE STP discharge."

"Background Data"
"7Q10",   "cBOD5",  "TKN",    "DO",     "Temp"
"(mgd)",  "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
33.3513, 2,        .31,      6.23,     25.3

"Discharge/Tributary Input Data for Segment 1"
"Flow",   "cBOD5",  "TKN",    "DO",     "Temp"
"(mgd)",  "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
0,        25,       20,       ,5,       25.3

"Hydraulic Information for Segment 1"
"Length","Width",   "Depth",  "Velocity"
"(mi)",  "(ft)",    "(ft)",   "(ft/sec)"
.63,     103.245,  1.696,    .349

"Initial Mix Values for Segment 1"
"Flow",   "DO",     "cBOD",   "nBOD",   "DOSat",  "Temp"
"(mgd)",  "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
33.3513, 6.23,     5,        0,        8.286,    25.3

"Rate Constants for Segment 1. - (All units Per Day)"
"k1",   "k1@T", "k2",   "k2@T", "kn",   "kn@T", "BD",   "BD@T"
.5,     .638,   .476,   .54,    .15,    .226,   0,      0

"Output for Segment 1"
"Segment starts at HANOVER COURTHOUSE STP"
"Total", "Segm."
"Dist.", "Dist.",  "DO",     "cBOD",   "nBOD"
"(mi)",  "(mi)",   "(mg/l)", "(mg/l)", "(mg/l)"
0,       0,        6.23,     5,        0
.1,      .1,       6.249,    5,        0
.2,      .2,       6.268,    5,        0
.3,      .3,       6.287,    5,        0
.4,      .4,       6.306,    5,        0
.5,      .5,       6.325,    5,        0
.6,      .6,       6.343,    5,        0
.63,     .63,      6.349,    5,        0



"Discharge/Tributary Input Data for Segment 2"
"Flow",   "cBOD5",  "TKN",    "DO",     "Temp"
"(mgd)",  "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
0,        0,        0,        ,0,       0

"Incremental Flow Input Data for Segment 2"
"Flow",   "cBOD5",  "TKN",    "DO",     "Temp"
"(mgd)",  "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
.031,     2,        .31,      ,7.458,   25.3

"Hydraulic Information for Segment 2"
"Length","Width",   "Depth",  "Velocity"
"(mi)",  "(ft)",    "(ft)",   "(ft/sec)"
5.37,    65.955,   1.696,    .547

"Initial Mix Values for Segment 2"
```

```
"Flow",   "DO",       "cBOD",     "nBOD",     "DOSat",    "Temp"
"(mgd)",  "(mg/l)",   "(mg/l)",   "(mg/l)",   "(mg/l)",   "deg C"
33.3823,  6.35,       5,          0,          8.287,      25.3

"Rate Constants for Segment 2. - (All units Per Day)"
"k1",    "k1@T",  "k2",    "k2@T",  "kn",    "kn@T",  "BD",   "BD@T"
.5,      .638,    .525,    .595,    .15,     .226,    0,      0

"Output for Segment 2"
"Segment starts at "
"Total",  "Segm."
"Dist.",  "Dist.",   "DO",       "cBOD",     "nBOD"
"(mi)",   "(mi)",    "(mg/l)",   "(mg/l)",   "(mg/l)"
.63,      0,         6.35,       5,          0
.73,      .1,        6.363,      5,          0
.83,      .2,        6.376,      5,          0
.93,      .3,        6.389,      5,          0
1.03,     .4,        6.402,      5,          0
1.13,     .5,        6.415,      5,          0
1.23,     .6,        6.427,      5,          0
1.33,     .7,        6.439,      5,          0
1.43,     .8,        6.451,      5,          0
1.53,     .9,        6.463,      5,          0
1.63,     1,         6.475,      5,          0
1.73,     1.1,       6.487,      5,          0
1.83,     1.2,       6.499,      5,          0
1.93,     1.3,       6.511,      5,          0
2.03,     1.4,       6.523,      5,          0
2.13,     1.5,       6.535,      5,          0
2.23,     1.6,       6.547,      5,          0
2.33,     1.7,       6.559,      5,          0
2.43,     1.8,       6.57,       5,          0
2.53,     1.9,       6.581,      5,          0
2.63,     2,         6.592,      5,          0
2.73,     2.1,       6.603,      5,          0
2.83,     2.2,       6.614,      5,          0
2.93,     2.3,       6.625,      5,          0
3.03,     2.4,       6.636,      5,          0
3.13,     2.5,       6.647,      5,          0
3.23,     2.6,       6.658,      5,          0
3.33,     2.7,       6.669,      5,          0
3.43,     2.8,       6.68,       5,          0
3.53,     2.9,       6.691,      5,          0
3.63,     3,         6.702,      5,          0
3.73,     3.1,       6.713,      5,          0
3.83,     3.2,       6.723,      5,          0
3.93,     3.3,       6.733,      5,          0
4.03,     3.4,       6.743,      5,          0
4.13,     3.5,       6.753,      5,          0
4.23,     3.6,       6.763,      5,          0
4.33,     3.7,       6.773,      5,          0
4.43,     3.8,       6.783,      5,          0
4.53,     3.9,       6.793,      5,          0
4.63,     4,         6.803,      5,          0
4.73,     4.1,       6.813,      5,          0
4.83,     4.2,       6.823,      5,          0
4.93,     4.3,       6.833,      5,          0
5.03,     4.4,       6.843,      5,          0
5.13,     4.5,       6.853,      5,          0
5.23,     4.6,       6.863,      5,          0
5.33,     4.7,       6.872,      5,          0
5.43,     4.8,       6.881,      5,          0
5.53,     4.9,       6.89,       5,          0
```

5.63,	5,	6.899,	5,	0
5.73,	5.1,	6.908,	5,	0
5.83,	5.2,	6.917,	5,	0
5.93,	5.3,	6.926,	5,	0
6,	5.37,	6.932,	5,	0

"END OF FILE"

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge
to PAMUNKEY RIVER.

File Information

File Name:	C:\Documents and Settings\jvpalmore\My Documents\models\Hanover Cou
Date Modified:	April 29, 2009

Water Quality Standards Information

Stream Name:	PAMUNKEY RIVER
River Basin:	York River Basin
Section:	3
Class:	III - Nontidal Waters (Coastal and Piedmont)
Special Standards:	None

Background Flow Information

Gauge Used:	#01653000 Pamunkey River near Hanover, VA
Gauge Drainage Area:	1081 Sq.Mi.
Gauge 7Q10 Flow:	33.6 MGD
Headwater Drainage Area:	1073 Sq.Mi.
Headwater 7Q10 Flow:	33.35134 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges:	0 MGD
Incremental Flow in Segments:	3.108233E-02 MGD/Sq.Mi.

Background Water Quality

Background Temperature:	25.3 Degrees C
Background cBOD5:	2 mg/l
Background TKN:	0.31 mg/l
Background D.O.:	6.23 mg/l

Model Segmentation

Number of Segments:	2
Model Start Elevation:	28.9 ft above MSL
Model End Elevation:	23.7 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to PAMUNKEY RIVER.

Segment Information for Segment 1

Definition Information

Segment Definition:	A discharge enters.
Discharge Name:	HANOVER COURTHOUSE STP
VPDES Permit No.:	VA0062154

Discharger Flow Information

Flow:	0.09 MGD
cBOD5:	25 mg/l
TKN:	20 mg/l
D.O.:	5 mg/l
Temperature:	25.3 Degrees C

Geographic Information

Segment Length:	0.63 miles
Upstream Drainage Area:	1073 Sq.Mi.
Downstream Drainage Area:	1074 Sq.Mi.
Upstream Elevation:	28.9 Ft.
Downstream Elevation:	28.4 Ft.

Hydraulic Information

Segment Width:	103.245 Ft. 2
Segment Depth:	1.696 Ft. 2
Segment Velocity:	0.349 Ft./Sec. 2
Segment Flow:	33.351 MGD
Incremental Flow:	0.031 MGD (Applied at end of segment.)

Channel Information

Cross Section:	Rectangular 3
Character:	Mostly Straight 3
Pool and Riffle:	No 3
Bottom Type:	Sand 3
Sludge:	None 3
Plants:	None 3
Algae:	None 3

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge to PAMUNKEY RIVER.

<u>Segment Information for Segment 2</u>

<u>Definition Information</u>

Segment Definition:	A significant change occurs.

<u>Geographic Information</u>

Segment Length:	5.37 miles
Upstream Drainage Area:	1074 Sq.Mi.
Downstream Drainage Area:	1081 Sq.Mi.
Upstream Elevation:	28.4 Ft.
Downstream Elevation:	23.7 Ft.

<u>Hydraulic Information</u>

Segment Width:	65.955 Ft.
Segment Depth:	1.696 Ft.
Segment Velocity:	0.547 Ft./Sec.
Segment Flow:	33.351 MGD
Incremental Flow:	0.218 MGD (Applied at end of segment.)

<u>Channel Information</u>

Cross Section:	Rectangular
Character:	Mostly Straight
Pool and Riffle:	No
Bottom Type:	Sand
Sludge:	None
Plants:	None
Algae:	None

```
"Model Run For C:\Documents and Settings\jvpalmore\My Documents\models\Hanover
Courthouse 2009 - 2 segs w BIPCO stats.mod On 4/29/2009 5:50:09 PM"

"Model is for PAMUNKEY RIVER."
"Model starts at the HANOVER COURTHOUSE STP discharge."

"Background Data"
"7Q10",   "cBOD5",   "TKN",     "DO",      "Temp"
"(mgd)",  "(mg/l)",  "(mg/l)",  "(mg/l)",  "deg C"
33.3513, 2,          .31,       6.23,      25.3

"Discharge/Tributary Input Data for Segment 1"
"Flow",   "cBOD5",   "TKN",     "DO",      "Temp"
"(mgd)",  "(mg/l)",  "(mg/l)",  "(mg/l)",  "deg C"
.09,      25,        20,        ,5,        25.3

"Hydraulic Information for Segment 1"
"Length","Width",    "Depth",   "Velocity"
"(mi)",  "(ft)",     "(ft)",    "(ft/sec)"
.63,     103.245,    1.696,     .349

"Initial Mix Values for Segment 1"
"Flow",   "DO",      "cBOD",    "nBOD",    "DOSat",   "Temp"
"(mgd)",  "(mg/l)",  "(mg/l)",  "(mg/l)",  "(mg/l)",  "deg C"
33.4413, 6.227,      5.155,     .198,      8.286,     25.3

"Rate Constants for Segment 1. - (All units Per Day)"
"k1",   "k1@T", "k2",   "k2@T", "kn",   "kn@T", "BD",  "BD@T"
.5,     .638,   .476,   .54,    .15,    .226,   0,     0

"Output for Segment 1"
"Segment starts at HANOVER COURTHOUSE STP"
"Total", "Segm."
"Dist.", "Dist.",   "DO",      "cBOD",    "nBOD"
"(mi)",  "(mi)",    "(mg/l)",  "(mg/l)",  "(mg/l)"
0,       0,         6.227,     5.155,     .198
.1,      .1,        6.189,     5.098,     .197
.2,      .2,        6.152,     5.041,     .196
.3,      .3,        6.116,     5,         .195
.4,      .4,        6.136,     5,         .194
.5,      .5,        6.155,     5,         .193
.6,      .6,        6.174,     5,         .192
.63,     .63,       6.18,      5,         .192



"Discharge/Tributary Input Data for Segment 2"
"Flow",   "cBOD5",   "TKN",     "DO",      "Temp"
"(mgd)",  "(mg/l)",  "(mg/l)",  "(mg/l)",  "deg C"
0,        0,         0,         ,0,        0

"Incremental Flow Input Data for Segment 2"
"Flow",   "cBOD5",   "TKN",     "DO",      "Temp"
"(mgd)",  "(mg/l)",  "(mg/l)",  "(mg/l)",  "deg C"
.031,     2,         .31,       ,7.458,    25.3

"Hydraulic Information for Segment 2"
"Length","Width",    "Depth",   "Velocity"
"(mi)",  "(ft)",     "(ft)",    "(ft/sec)"
5.37,    65.955,     1.696,     .547

"Initial Mix Values for Segment 2"
```

"Flow",	"DO",	"cBOD",	"nBOD",	"DOSat",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
33.4723,	6.181,	5,	.192,	8.287,	25.3

"Rate Constants for Segment 2. - (All units Per Day)"

"k1",	"k1@T",	"k2",	"k2@T",	"kn",	"kn@T",	"BD",	"BD@T"
.5,	.638,	.525,	.595,	.15,	.226,	0,	0

"Output for Segment 2"
"Segment starts at "

"Total",	"Segm."			
"Dist.",	"Dist.",	"DO",	"cBOD",	"nBOD"
"(mi)",	"(mi)",	"(mg/l)",	"(mg/l)",	"(mg/l)"
.63,	0,	6.181,	5,	.192
.73,	.1,	6.194,	5,	.192
.83,	.2,	6.207,	5,	.192
.93,	.3,	6.22,	5,	.192
1.03,	.4,	6.233,	5,	.192
1.13,	.5,	6.246,	5,	.192
1.23,	.6,	6.259,	5,	.192
1.33,	.7,	6.272,	5,	.192
1.43,	.8,	6.285,	5,	.192
1.53,	.9,	6.298,	5,	.192
1.63,	1,	6.311,	5,	.192
1.73,	1.1,	6.324,	5,	.192
1.83,	1.2,	6.337,	5,	.192
1.93,	1.3,	6.349,	5,	.192
2.03,	1.4,	6.361,	5,	.192
2.13,	1.5,	6.373,	5,	.192
2.23,	1.6,	6.385,	5,	.192
2.33,	1.7,	6.397,	5,	.192
2.43,	1.8,	6.409,	5,	.192
2.53,	1.9,	6.421,	5,	.192
2.63,	2,	6.433,	5,	.192
2.73,	2.1,	6.445,	5,	.192
2.83,	2.2,	6.457,	5,	.192
2.93,	2.3,	6.469,	5,	.192
3.03,	2.4,	6.481,	5,	.192
3.13,	2.5,	6.492,	5,	.192
3.23,	2.6,	6.503,	5,	.192
3.33,	2.7,	6.514,	5,	.192
3.43,	2.8,	6.525,	5,	.192
3.53,	2.9,	6.536,	5,	.192
3.63,	3,	6.547,	5,	.192
3.73,	3.1,	6.558,	5,	.192
3.83,	3.2,	6.569,	5,	.192
3.93,	3.3,	6.58,	5,	.192
4.03,	3.4,	6.591,	5,	.192
4.13,	3.5,	6.602,	5,	.192
4.23,	3.6,	6.613,	5,	.192
4.33,	3.7,	6.624,	5,	.192
4.43,	3.8,	6.635,	5,	.192
4.53,	3.9,	6.645,	5,	.192
4.63,	4,	6.655,	5,	.192
4.73,	4.1,	6.665,	5,	.192
4.83,	4.2,	6.675,	5,	.192
4.93,	4.3,	6.685,	5,	.192
5.03,	4.4,	6.695,	5,	.192
5.13,	4.5,	6.705,	5,	.192
5.23,	4.6,	6.715,	5,	.192
5.33,	4.7,	6.725,	5,	.192
5.43,	4.8,	6.735,	5,	.192
5.53,	4.9,	6.745,	5,	.192

5.63,	5,	6.755,	5,	.192
5.73,	5.1,	6.765,	5,	.192
5.83,	5.2,	6.775,	5,	.192
5.93,	5.3,	6.785,	5,	.192
6,	5.37,	6.792,	5,	.192

"END OF FILE"

1 "Water Quality Modeling, North Anna and Pamunkey River, York River Basin, Virginia", HDR Infrastructure, Inc., HDR Project 317-10-35, January 1988 – Appendix I, K27.wk1 model output, 0.0 MGD discharge (background) summer condition

2 "Conceptual Engineering Report in Support of Bear Island Paper Company, L.L.C., VPDES Permit Application, Ashland, Virginia", AWARE Environmental, Inc., AEI Job N106-17, Revised March 1999 – Attachment D, Hydraulics Summary Reach 8

3 "Proposed Effluent Limits for Hanover Courthouse STP (VA0062154)", DEQ memorandum from D.X. Ren, April 25, 1994 – Attached model files

TEMP = 27 Deg C
Cs = 7.95 mg/l

D = Do*Exp(-K2*t) + K1*La/(K2-K1)*(Exp(-K1*t)-Exp(-K2*t))
+ Kn*No/(K2-Kn)*(Exp(-Kn*t)-Exp(-K2*t)) + SOD/K2*(1-EXP(-K2*t))

************ REACH 1 ************************
V = 4.7 mi/d K1 0.15 1/day SOD,mg/l/d
K2 = 1.5 1/day Kn 0.51 1/day 6.15

R M	MILE	CBODU	TKN	D-TKN	DO DEF	DO
3.50	0.00	4.09	0.41	0.41	0.22	7.73
3.40	0.10	4.08	0.40	0.40	0.37	7.58
3.30	0.20	4.06	0.40	0.40	0.52	7.43
3.20	0.30	4.05	0.39	0.39	0.67	7.28
3.10	0.40	4.04	0.39	0.39	0.81	7.14
3.00	0.50	4.02	0.38	0.38	0.94	7.01
2.90	0.60	4.01	0.38	0.38	1.07	6.88
2.80	0.70	4.00	0.38	0.38	1.20	6.75

************ REACH 2 ************************
V = 3.1 mi/d K1 0.15 1/day SOD,mg/l/d
K2 = 1.2 1/day Kn 0.34 1/day 2.46

R M	MILE	CBODU	TKN	D-TKN	DO DEF	DO
2.70	0.10	3.98	0.37	0.37	1.27	6.68
2.60	0.20	3.96	0.37	0.37	1.33	6.62
2.50	0.30	3.94	0.36	0.36	1.40	6.55
2.40	0.40	3.92	0.36	0.36	1.46	6.49
2.30	0.50	3.90	0.36	0.36	1.52	6.43
2.20	0.60	3.88	0.35	0.35	1.57	6.38
2.10	0.70	3.86	0.35	0.35	1.63	6.32
2.00	0.80	3.84	0.34	0.34	1.68	6.27
1.90	0.90	3.83	0.34	0.34	1.73	6.22
1.80	1.00	3.81	0.34	0.34	1.78	6.17
1.70	1.10	3.79	0.33	0.33	1.82	6.13
1.60	1.20	3.77	0.33	0.33	1.86	6.09
1.50	1.30	3.75	0.33	0.33	1.91	6.04
1.40	1.40	3.73	0.32	0.32	1.95	6.00
1.30	1.50	3.72	0.32	0.32	1.98	5.97

************ REACH 3 ************************
V = 3.9 mi/d K1 0.15 1/day SOD,mg/l/d
K2 = 2.2 1/day Kn 0.34 1/day 2.21

R M	MILE	CBODU	TKN	D-TKN	DO DEF	DO
1.20	0.10	3.70	0.32	0.32	1.95	6.00
1.10	0.20	3.69	0.31	0.31	1.92	6.03
1.00	0.30	3.67	0.31	0.31	1.90	6.05
0.90	0.40	3.66	0.31	0.31	1.87	6.08
0.80	0.50	3.64	0.31	0.31	1.85	6.10
0.70	0.60	3.63	0.30	0.30	1.82	6.13
0.60	0.70	3.62	0.30	0.30	1.80	6.15
0.50	0.80	3.60	0.30	0.30	1.78	6.17
0.40	0.90	3.59	0.29	0.29	1.76	6.19
0.30	1.00	3.57	0.29	0.29	1.74	6.21
0.20	1.10	3.56	0.29	0.29	1.72	6.23
0.10	1.20	3.55	0.29	0.29	1.71	6.24
0.00	1.30	3.53	0.28	0.28	1.69	6.26

************ REACH 4 ************************
V = 8.5 mi/d K1 0.14 1/day SOD,mg/l/d
K2 = 2.4 1/day Kn 0.34 1/day 3.07

R M	MILE	CBODU	TKN	D-TKN	DO DEF	DO
94.10	0.00	3.57	0.39	0.39	1.72	6.23
93.50	0.60	3.53	0.38	0.38	1.73	6.22
92.90	1.20	3.50	0.37	0.37	1.73	6.22
92.30	1.80	3.46	0.36	0.36	1.73	6.22
91.70	2.40	3.43	0.35	0.35	1.73	6.22
91.10	3.00	3.40	0.35	0.35	1.73	6.22
90.50	3.60	3.36	0.34	0.34	1.73	6.22
89.90	4.20	3.33	0.33	0.33	1.72	6.23
89.30	4.80	3.30	0.32	0.32	1.72	6.23
88.70	5.40	3.27	0.31	0.31	1.72	6.23
88.10	6.00	3.24	0.31	0.31	1.71	6.24

************ REACH 5 ************************
V = 9.7 mi/d K1 0.14 1/day SOD,mg/l/d
K2 = 3.0 1/day Kn 0.34 1/day 1.84

R M	MILE	CBODU	TKN	D-TKN	DO DEF	DO
87.60	0.50	3.21	0.30	0.30	1.60	6.35
87.10	1.00	3.19	0.30	0.30	1.50	6.45
86.60	1.50	3.17	0.29	0.29	1.42	6.53
86.10	2.00	3.15	0.29	0.29	1.35	6.60
85.60	2.50	3.12	0.28	0.28	1.29	6.66
85.10	3.00	3.10	0.28	0.28	1.24	6.71
84.60	3.50	3.08	0.27	0.27	1.19	6.76
84.10	4.00	3.06	0.27	0.27	1.15	6.80
83.60	4.50	3.04	0.26	0.26	1.11	6.84
83.10	5.00	3.01	0.26	0.26	1.08	6.87
82.60	5.50	2.99	0.25	0.25	1.06	6.89
82.10	6.00	2.97	0.25	0.25	1.03	6.92

D O MIX = 7.73 mg/l
WITHDRAWAL = 10.5 MGD
0.0 MGD @ 82.73 mg/l CBODU = 18.4 mg/l BOD5 = 0.0 lbs/day

DEGRADABLE FRACTION OF BIPCO TKN = 0.46
CBODU/CBOD5= 4.50

RATE CONSTANT	THETA
*************	*****
K1	1.047
K2	1.024
KN	1.080
SOD	1.030

@ 20 Deg C

REACH	K1	K2	KN	SOD
*****	****	****	****	******
1	0.110	1.30	0.30	5.0
2	0.110	1.00	0.20	2.0
3	0.110	1.90	0.20	1.8
4	0.100	2.00	0.20	2.5
5	0.100	2.50	0.20	1.5

HEADWATER FLOW = 25.63 cfs
HEADWATER BODU = 4.20 mg/l
HEADWATER TKN = 0.40 mg/l

EFFLUENT FLOW = 0.00 cfs = 0.0 MGD
EFFLUENT BODU = 82.73 mg/l
EFFLUENT TKN = 10.00 mg/l

LITTLE R. FLOW = 1.77 cfs
LITTLE R. BODU = 2.50 mg/l
LITTLE R. TKN = 0.50 mg/l

7Q10 = 41.91 cfs

WITHDRAWAL = 16.28 cfs = 10.5 MGD

**** @ CONFLUENCE ***
N. ANNA Flow = 27.40

S. ANNA D O = 6.19
S. ANNA Flow = 26.25
S. ANNA CBOD = 3.60
S. ANNA TKN = 0.50

PAMUNKEY Flow = 53.65

mg/l; the minimum DO of 6.23 mg/l can be maintained without supplemental effluent oxygenation (Figure 7-4).

7.4.2 Model Simulation For Summer Season

For the months of July, August, and September, the critical temperature is 27°C and the critical background DO is 5.97 mg/l (Table 7-2). The model indicates that the minimuim DO of 5.77 mg/l (5.97 mg/l minus 0.2 mg/l) can be maintained at 7Q10 flow in the North Anna River for an initial in-stream UCBOD mix of 20.04 mg/l (4.5 MGD and 690 lbs $CBOD_5$ per day), if the initial in-stream DO mix is 12.65 mg/l. For an upstream DO of 7.73 mg/l (Table 7-2), this requires effluent oxygenation to a concentration of 32 mg/l, based on a mass balance at the discharge point.

The model indicates that with the maximum mill discharge, a North Anna flow of 97.7 cfs, and an upstream DO of 7.73 mg/l; the minimum DO of 5.77 mg/l can be maintained in the North Anna River without supplemental effluent oxygenation.

The model indicates that with the maximum combined discharge of the mill and the storage ponds, a North Anna flow of 222.7 cfs, and an upstream DO of 7.73 mg/l; the minimum DO of 5.77 mg/l can be maintained without supplemental effluent oxygenation.

7.4.3 Model Simulation For Fall Season

For the months of October, November, and December, the critical temperature is 16°C and the critical background DO is 7.87 mg/l (Table 7-2). The model indicates that the minimuim DO of 7.67 mg/l (7.87 mg/l

80	6	5	90.20	90.10	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
81	6	6	90.10	90.00	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
82	6	7	90.00	89.90	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68

***** STEADY STATE SIMULATION *****

** HYDRAULICS SUMMARY **

ELE ORD	RCH NUM	ELE NUM	BEGIN LOC MILE	END LOC MILE	FLOW CFS	POINT SRCE CFS	INCR FLOW CFS	VEL FPS	TRVL TIME DAY	DEPTH FT	WIDTH FT	VOLUME K-FT-3	BOTTOM AREA K-FT-2	X-SECT AREA FT-2	DSPRSN COEF FT-2/S
83	6	8	89.90	89.80	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
84	6	9	89.80	89.70	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
85	6	10	89.70	89.60	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
86	6	11	89.60	89.50	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
87	6	12	89.50	89.40	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
88	6	13	89.40	89.30	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
89	6	14	89.30	89.20	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
90	6	15	89.20	89.10	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
91	6	16	89.10	89.00	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
92	6	17	89.00	88.90	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
93	6	18	88.90	88.80	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
94	6	19	88.80	88.70	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
95	6	20	88.70	88.60	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
96	7	1	88.60	88.50	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
97	7	2	88.50	88.40	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
98	7	3	88.40	88.30	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
99	7	4	88.30	88.20	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
100	7	5	88.20	88.10	61.17	0.00	0.00	0.349	0.017	1.696	103.245	92.48	56.30	175.14	13.68
101	8	1	88.10	88.00	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
102	8	2	88.00	87.90	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
103	8	3	87.90	87.80	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
104	8	4	87.80	87.70	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
105	8	5	87.70	87.60	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
106	8	6	87.60	87.50	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
107	8	7	87.50	87.40	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
108	8	8	87.40	87.30	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
109	8	9	87.30	87.20	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
110	8	10	87.20	87.10	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
111	8	11	87.10	87.00	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
112	8	12	87.00	86.90	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
113	8	13	86.90	86.80	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
114	8	14	86.80	86.70	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
115	8	15	86.70	86.60	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
116	8	16	86.60	86.50	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
117	8	17	86.50	86.40	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41

118	9	1	86.40	86.30	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
119	9	2	86.30	86.20	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
120	9	3	86.20	86.10	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
121	9	4	86.10	86.00	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
122	9	5	86.00	85.90	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41

***** STEADY STATE SIMULATION *****

** HYDRAULICS SUMMARY **

ELE ORD	RCH NUM	ELE NUM	BEGIN LOC MILE	END LOC MILE	FLOW CFS	POINT SRCE CFS	INCR FLOW CFS	VEL FPS	TRVL TIME DAY	DEPTH FT	WIDTH FT	VOLUME K-FT-3	BOTTOM AREA K-FT-2	X-SECT AREA FT-2	DSPRSN COEF FT-2/S
123	9	6	85.90	85.80	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
124	9	7	85.80	85.70	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
125	9	8	85.70	85.60	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
126	9	9	85.60	85.50	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
127	9	10	85.50	85.40	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
128	9	11	85.40	85.30	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
129	9	12	85.30	85.20	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
130	9	13	85.20	85.10	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
131	9	14	85.10	85.00	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
132	9	15	85.00	84.90	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
133	9	16	84.90	84.80	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
134	9	17	84.80	84.70	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
135	9	18	84.70	84.60	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
136	9	19	84.60	84.50	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
137	9	20	84.50	84.40	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
138	10	1	84.40	84.30	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
139	10	2	84.30	84.20	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
140	10	3	84.20	84.10	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
141	10	4	84.10	84.00	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
142	10	5	84.00	83.90	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
143	10	6	83.90	83.80	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
144	10	7	83.80	83.70	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
145	10	8	83.70	83.60	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
146	10	9	83.60	83.50	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
147	10	10	83.50	83.40	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
148	10	11	83.40	83.30	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
149	10	12	83.30	83.20	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
150	10	13	83.20	83.10	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
151	10	14	83.10	83.00	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
152	10	15	83.00	82.90	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
153	10	16	82.90	82.80	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
154	10	17	82.80	82.70	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
155	10	18	82.70	82.60	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
156	10	19	82.60	82.50	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41
157	10	20	82.50	82.40	61.17	0.00	0.00	0.547	0.011	1.696	65.955	59.07	36.62	111.88	21.41

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4900 Cox Road Glen Allen, VA 23060 804/527-5020

SUBJECT: Proposed Effluent Limits for Hanover Courthouse STP (VA0062154)

TO: Curt Linderman

FROM: D. X. Ren

DATE: April 25, 1994

COPIES: Allan Brockenbrough, Jon Van Soestbergen, Technical Services, File

Modeling Purpose

Hanover County submitted a VPDES Permit Application for an expansion at the Courthouse STP.

The purpose of this memorandum is to develop effluent limits for a discharge flow of 0.08 MGD.

Background Information

Since 1978, at least five water quality studies have been conducted for the North Anna/South Anna/Pamunkey River area, including the Streeter-Phelps Model (CBOXYSAG) and Qual-2E Model (see reference). However, up to now, no basinwide model has been developed for basinwide planning purposes.

Hanover Courthouse STP is within this study area. The discharge is located 9.2 miles downstream of a major municipal/industrial discharge-Doswell WWTP's. Therefore, the Doswell discharge has a significant impact on the background water quality at the Hanover courthouse discharge point. The determination of the background headwater flow and water quality at the Hanover Courthouse STP depends on these aforementioned studies, and the information regarding the regulated North Anna River Gauge and the Doswell WWTP effluent limitations.

Therefore, the information collected for assembling a dataset for modeling the Hanover Courthouse STP discharge is based on the aforesaid technical documents.

Four Water Quality Models were considered in selecting a model for the subject discharge:

1) HRD Model on Lotus version provided by the Bear Island Paper Company in 1988;
2) CBOXYSAG Model on Mainframe developed by SWCB in 1970s;
3) Steady State model (version 4.2 and 5.2) developed by SWCB during 1989-1992;
4) The Regional Model (version 3.2) developed by SWCB in 1992;

Model Selection

All of these models are based on the Streeter-Phelps Equation. The Regional Model was selected by me to determine the effluent limits for the Hanover Courthouse STP discharge based on the following reasons:

a) Suitability: The subject increased discharge flow is insignificant (0.08 MGD) compared to Doswell WWTP discharge flow.

b) Compatibility: The Regional model is capable of reflecting the impact caused by the upstream discharge. Predicted water quality data was abstracted from previous model results and used as an input for the background condition in the regional model.

Site Inspection

The proposed increased discharge will be located at the same site as the current outfall. The WBS is F14-01.

A site inspection was performed on April 14, 1994 to verify the selected channel's characteristics. It is my observation that the the segment selected for the Regional model looks very homogeneous. The flow of the Pamunkey River provides significant dilution capacity at the discharge point. The current wastewater treatment pattern, extended aeration process, produces a good quality effluent. Also, all information needed for the modeling at this time were taken from SWCB and BIP modeling documents.

7Q10 Flow Estimates:

The USGS gauge 01673000 Pamunkey River near Hanover, Virginia was selected as the reference gauge to determine 1Q10, 7Q10, 30Q5, and harmonic mean flows for the discharge point. The high flow months are December through April.

Gauge Drainage Area = 1081 square miles

1Q10	= 45.9 MGD or 71 cfs
Dry 7Q10	= 47.2 MGD or 73 cfs
High Flow 1Q10	= 112.5 MGD or 174 cfs
High Flow 7Q10	= 149.3 MGD or 231 cfs
30Q5	= 62.7 MGD or 97 cfs
Harmonic Mean	= 228.8 MGD or 354 cfs

At the proposed discharge point:

Drainage Area = 1070.63 square miles

1Q10	= 45.2 MGD or 70 cfs
Dry 7Q10	= 46.5 MGD or 72 cfs
High Flow 1Q10	= 111.2 MGD or 172 cfs
High Flow 7Q10	= 148.0 MGD or 229 cfs
30Q5	= 62.1 MGD or 96 cfs
Harmonic Mean	= 226.9 MGD or 351 cfs

Antidegradation Policy:

Based on the BIPCO modeling report, the antidegradation policy was applied at the discharge point at the confluence of the North Anna River with the Little River (page 79). The minimum allowable DO in the receiving river during any given season is 0.2 mg/l below the naturally occurring DO sag. For the month of July, August and September, the critical temperature is 27°C and the critical background DO is 5.97 mg/l at the BIPCO discharge point. (see BIPCO Modeling Report, page 94 and Table 7-2).

According to the BIPCO model, in the summer season, background water at Hanover STP discharge point (RM=88.7) are: CBODu= 10.97 mg/l, CBODu/$CBOD_5$ = 4.5, $CBOD_5$ =2.44 mg/l, TKN= 1.15 mg/l, DO= 5.71 mg/l. Therefore this information was used in the Regional Model as upstream discharge input for the Hanover Courthouse STP discharge.

To satisfy the antidegradation policy in the Regional Model, the minimum DO will be maintained at 5.098 mg/l at the DO sag with the Hanover Courthouse discharge comparing to the baseline at DO sag of 5.143 mg/l if without the subject discharge.

According to the retrieved information from the representive AQM station 8-PMK082.34, no water quality violations were found. The receiving water is considered to be a high quality (Tier 2) waters. For an increased discharge, the antidegradation review is required based on the DEQ Headquarter's guideline (VR-680-21-01.3).

Modeling Approach

As mentioned above, the regional model was selected to simulate the subject discharge. The model starts at the Hanover Courthouse STP discharge point on the Pamunkey River (Rivermile 88.1) and ends at the Pamunkey River near Norman Bridge (Rivermile 82.1). The actual total length of the simulated segment is about 5.77 miles. Only one segment was simulated in the model.

The background water quality condition for the subject discharge point was taken from the BIPCO model (Lotus version, K27.wk1) under the summer critical temperature 27°C. Year round temperature, pH and Mean Hardness were determined based on AQM Station PMK082.34: Temperature= 25.4°C, pH= 7.7 S.U., Mean Hardness= 35.4 mg/l. In the Regional Model, a temperature of 25.4°C was used based on the representive AQM information.

The following effluent limits are the result of this modeling run:

Hanover Courthouse STP

Q = 0.08 MGD
BOD_5 = 30 mg/l
DO = 5.0 mg/l
@ Temperature = 25.4°C

Modeling results indicated that the Model is able to offer as much as TKN= 17 mg/l for this subject discharge for DO concerns. Also, a run of the WLA2 program using data provided by Hanover County indicated no limits are needed for Ammonia Nitrogen. Therefore a TKN limit will not be included in the permit limits.

The computer printout copy, the topographic map, and schematic showing the discharge point are attached for your reference.

If you have any questions, please let me know.

Reference:

1) Water Quality Modeling Report, North Anna and Pamunkey River, Prepared by HRD Infrastructure Inc. for Bear Island Paper Conpany, January 1988;

2) Water Quality Intensive Survey and Modeling, Pamunkey River, Prepared by Virginia State Water Control Board, 1979;

3) Water Quality Intensive Survey and Modeling, South Anna River, Prepared by Virginia State Water Control Board, 1982;

4) Water Quality Intensive Survey and Modeling, Totopotomoy Creek, Prepared by Virginia State Water Quality Modeling Report, Pamunkey River, Prepared by Black and Veatch, prepared for Hanover County, 1989;

5) Water Quality Modeling Report, Pamunkey River, Prepared by B&V Consultant for Hanover County, 1989.

\dxr

04/19/94
final draft
(DA at the di
point was ц

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REGIONAL MODELING SYSTEM VERSION 3.2

DATA FILE SUMMARY

****

THE NAME OF THE DATA FILE IS: HANOVER2.MOD

THE STREAM NAME IS: PAMUNKEY RIVER
THE RIVER BASIN IS: YORK RIVER
THE SECTION NUMBER IS: 3
THE CLASSIFICATION IS: III

STANDARDS VIOLATED (Y/N) = N
STANDARDS APPROPRIATE (Y/N) = Y

DISCHARGE WITHIN 3 MILES (Y/N) = Y

UPSTREAM DISCHARGE FLOW = 6.56 MGD
BOUNDARY BOD5 = 2.44 MG/L
BOUNDARY TKN = 1.15 MG/L
BOUNDARY D.O. = 5.71 MG/L

THE DISCHARGE BEING MODELED IS: HANOVER COURTHOUSE STP

PROPOSED LIMITS ARE:
FLOW = .08 MGD
BOD5 = 25 MG/L
TKN = 17 MG/L
D.O. = 5 MG/L

THE NUMBER OF SEGMENTS TO BE MODELED = 1

7Q10 WILL BE CALCULATED BY: DRAINAGE AREA COMPARISON
THE GAUGE NAME IS: USGS GAGE 01673000 NEAR HANOVER
GAUGE DRAINAGE AREA = 1081 SQ.MI.
GAUGE 7Q10 = 47.19 MGD
DRAINAGE AREA AT DISCHARGE = 1070.63 SQ.MI.

STREAM A DRY DITCH AT DISCHARGE (Y/N) = N
ANTIDEGRADATION APPLIES (Y/N) = N

ALLOCATION DESIGN TEMPERATURE = 25.4 °C

SEGMENT INFORMATION

####### SEGMENT # 1 #######

SEGMENT ENDS BECAUSE: THE MODEL ENDS

SEGMENT LENGTH = 5.77 MI

SEGMENT WIDTH = 44.988 FT
SEGMENT DEPTH = 1.956 FT
SEGMENT VELOCITY = .947 FT/SEC

1070 ?

DRAINAGE AREA AT SEGMENT START = 1081 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 1085.1 SQ.MI.

ELEVATION AT UPSTREAM END = 29.02 FT
ELEVATION AT DOWNSTREAM END = 23.91 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MOSTLY STRAIGHT

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

****

REGIONAL MODELING SYSTEM Ver 3.2 (OWRM - 9/90)
04-19-1994 12:00:27

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******************************************************************************
 REGIONAL MODELING SYSTEM   VERSION 3.2
******************************************************************************
MODEL SIMULATION FOR THE  HANOVER COURTHOUSE STP  DISCHARGE

  TO  PAMUNKEY RIVER

     COMMENT: 04/19/1994 DA at the discharge point was updated
------------------------------------------------------------------------------

THE SIMULATION STARTS AT THE  HANOVER COURTHOUSE STP  DISCHARGE

************************   PROPOSED PERMIT LIMITS   *************************

FLOW =  .08 MGD    cBOD5 =  25 Mg/L     TKN =  17 Mg/L     D.O. =  5 Mg/L

****  THE MAXIMUM CHLORINE ALLOWABLE IN THE DISCHARGE IS  6.437 Mg/L   ****
------------------------------------------------------------------------------

THE SECTION BEING MODELED IS 1 SEGMENT LONG
RESULTS WILL BE GIVEN AT 0.1 MILE INTERVALS

*************************   BACKGROUND CONDITIONS   *************************

THE 7Q10 STREAM FLOW AT THE DISCHARGE IS  53.29731 MGD
THE DISSOLVED OXYGEN OF THE STREAM IS  5.710 Mg/L
THE BACKGROUND cBODu OF THE STREAM IS  6.1 Mg/L
THE BACKGROUND nBOD OF THE STREAM IS  0 Mg/L

***************************   MODEL PARAMETERS   ****************************
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SEG.	LEN. Mi	VEL. F/S	K2 1/D	K1 1/D	KN 1/D	BENTHIC Mg/L	ELEV. Ft	TEMP. °C	DO-SAT Mg/L
1	5.77	0.758	0.531	0.500	0.150	0.000	26.47	25.40	8.274

(The K Rates shown are at 20°C ... the model corrects them for temperature.)

********************* RESPONSE FOR SEGMENT 1 *********************

TOTAL STREAMFLOW = 53.3773 MGD
(Including Discharge)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	0.000	5.709	6.185	0.091
0.100	0.100	5.689	6.153	0.091
0.200	0.200	5.670	6.121	0.090
0.300	0.300	5.651	6.089	0.090
0.400	0.400	5.633	6.058	0.090
0.500	0.500	5.614	6.027	0.090
0.600	0.600	5.596	5.996	0.090
0.700	0.700	5.578	5.965	0.090
0.800	0.800	5.560	5.934	0.089
0.900	0.900	5.543	5.904	0.089
1.000	1.000	5.525	5.873	0.089
1.100	1.100	5.508	5.843	0.089
1.200	1.200	5.492	5.813	0.089
1.300	1.300	5.475	5.783	0.088
1.400	1.400	5.459	5.753	0.088
1.500	1.500	5.443	5.723	0.088
1.600	1.600	5.427	5.694	0.088
1.700	1.700	5.411	5.665	0.087
1.800	1.800	5.396	5.635	0.087
1.900	1.900	5.381	5.607	0.087
2.000	2.000	5.366	5.578	0.087
2.100	2.100	5.351	5.549	0.087
2.200	2.200	5.337	5.520	0.086
2.300	2.300	5.322	5.492	0.086
2.400	2.400	5.308	5.464	0.086
2.500	2.500	5.295	5.436	0.086
2.600	2.600	5.281	5.407	0.086
2.700	2.700	5.268	5.380	0.086
2.800	2.800	5.254	5.352	0.085
2.900	2.900	5.241	5.324	0.085
3.000	3.000	5.229	5.297	0.085
3.100	3.100	5.216	5.270	0.085
3.200	3.200	5.204	5.242	0.084
3.300	3.300	5.191	5.215	0.084
3.400	3.400	5.179	5.189	0.084
3.500	3.500	5.168	5.162	0.084
3.600	3.600	5.156	5.135	0.084
3.700	3.700	5.145	5.109	0.083
3.800	3.800	5.133	5.082	0.083
3.900	3.900	5.122	5.056	0.083
4.000	4.000	5.112	5.030	0.083
4.100	4.100	5.101	5.004	0.083
4.200	4.200	5.090	5.000	0.083
4.300	4.300	5.106	5.000	0.082
4.400	4.400	5.121	5.000	0.082
4.500	4.500	5.136	5.000	0.082
4.600	4.600	5.151	5.000	0.082
4.700	4.700	5.166	5.000	0.082

5.100	5.100	5.226	5.000	0.081
5.200	5.200	5.240	5.000	0.081
5.300	5.300	5.255	5.000	0.081
5.400	5.400	5.269	5.000	0.081
5.500	5.500	5.284	5.000	0.081
5.600	5.600	5.298	5.000	0.081
5.700	5.700	5.313	5.000	0.081
5.770	5.770	5.323	5.000	0.081

****

REGIONAL MODELING SYSTEM   Ver 3.2   (DWRM - 9/90)
04-19-1994   12:01:46

DATA FILE = HANOVER2.MOD

Attachment I

VDH Comments

RECEIVED PRO
JUN 12 2014

COMMONWEALTH of VIRGINIA

Marissa J. Levine, MD, MPH, FAAFP
State Health Commissioner

John J. Aulbach II, PE
Director, Office of Drinking Water

DEPARTMENT OF HEALTH
OFFICE OF DRINKING WATER
East Central Field Office

300 Turner Road
Richmond, VA 23225
Phone: 804-674-2880
Fax: 804-674-2815

DATE: June 6, 2014

FROM: Bennett K. Ragnauth, P.E., Engineering Field Director
East Central Field Office, Office of Drinking Water

BKRagnauth 6/6/2014

TO: Ms.Laura Gaffi, VPDES Permit Writer
Department of Environmental Quality, Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA, 23060

CITY/COUNTY: Hanover County
APPLICANT: Mr. Cecil R. Harris, Jr., County Administrator
PERMIT TYPE: VPDES
APPLICATION TYPE: Re-Issuance (Existing)
PROJECT: Hanover Courthouse STP
SUBJECT: Review response for DEQ's permit application No. VA0062154

Our office has reviewed the application for Hanover Courthouse Wastewater Treatment Plant (WWTP) located south of Pamunkey River and north of Normans Bridge Road (Route 614), east of Hanover Courthouse Road (Route 301) and west of Route 601. The permit is for a discharge of disinfected effluent from the secondary clarifiers at Hanover Courthouse WWTP to the Pamunkey River which discharges to the York River, a tributary of the Chesapeake Bay.

There are no apparent impacts to waterworks sources as a result of this permit.

Other comments:

Reviewer: HGB

ec: Hanover Co. Health Dept., Attn. Environmental Health Manager
cc: VDH, ODW – Central Office
Mr. Cecil R. Harris, Jr., Hanover County Administrator

R:\PD15A\05-ProjectReview\01-ApplicationsDEQ\01-VPDES Appl\Hanover Courthouse STP14.docx

Attachment J

DCR Comments

Molly Joseph Ward
Secretary of Natural Resources

Clyde E. Cristman
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

600 East Main Street, 24th Floor
Richmond, Virginia 23219
(804) 786-6124

June 26, 2014

Laura Galli
DEQ-PRO
4949-A Cox Road
Glen Allen, VA 23060

Re: VA0062154, Hanover Courthouse STP Permit Reissuance

Dear Ms. Galli:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, the Pamunkey River – Mechumps Creek Stream Conservation Unit (SCU) is located downstream from the project site. SCUs identify stream reaches that contain aquatic natural heritage resources, including 2 miles upstream and 1 mile downstream of documented occurrences, and all tributaries within this reach. SCUs are also given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain. The Pamunkey River – Mechumps Creek SCU has been given a biodiversity ranking of B5, which represents a site of general significance. The natural heritage resource associated with this site is:

Lampsilis cariosa	Yellow lampmussel	G3G4/S2/NL/NL

The Yellow lampmussel ranges from Nova Scotia to Georgia in Atlantic slope drainages (NatureServe, 2009). In Virginia, it is recorded from the Roanoke, Chowan, James, York, and Potomac drainages. It is found in larger streams and rivers where good currents exist over sand and gravel substrates and in small creeks and ponds (Johnson, 1970).

In addition, the Eastern lampmussel (*Lampsilis radiata,* G5/S2S3/NL/NL) has been historically documented downstream from the project site. The Eastern lampmussel is a freshwater mussel which inhabits river systems in areas with substrates composed of silt, sand, cobble, gravel and exposed bedrock (NatureServe, 2009). This species has a wide range, from eastern Canada west to Ontario and Quebec and south to South Carolina (NatureServe, 2009). In Virginia, there are records from the Chowan and York River drainages.

Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18: 6-9.

Attachment K

2011 Warning Letter

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
PIEDMONT REGIONAL OFFICE
4949-A Cox Road, Glen Allen, Virginia 23060
(804) 527-5020 Fax (804) 527-5106
www.deq.virginia.gov

Douglas W. Domenech
Secretary of Natural Resources

David K. Paylor
Director

Michael P. Murphy
Regional Director

November 3, 2011

Mr. David F. Van Gelder, Chief of Operations and Maintenance
Hanover County Department of Public Utilities
7516 County Complex Road
Hanover, VA 23069-1530

WARNING LETTER

RE: **WL # W2011-11-P-1001**
Hanover Courthouse Waste Water Treatment Plant (WWTP)
VPDES Permit No. VA0062154 (reissued/effective November 3, 2009)

Dear Mr. Van Gelder:

The Department of Environmental Quality (DEQ or the Department) has reason to believe that the Hanover County may be in violation of the State Water Control Law and Regulations at the Hanover Courthouse WWTP.

This letter addresses conditions at the facility named above, and also cites compliance requirements of the State Water Control Law and Regulations. Pursuant to Va. Code § 62.1-44.15(8a), this letter is not a case decision under the Virginia Administrative Process Act, Va. Code § 2.2-4000 *et seq*. (APA).

a) The Discharge Monitoring Report (DMR) submitted for the September 2011 monitoring period listed an E. coli average concentration of 1371 #C/ml, versus a permit allowable average concentration of 126 #C/ml.

Va. Code § 62.1-44.23 of the State Water Control Law provides for an injunction for any violation of the State Water Control Law, any State Water Control Board rule or regulation, an order, permit condition, standard, or any certificate requirement or provision. Va. Code §§ 62.1-44.15 and 62.1-44.32 provide for a civil penalty up to $32,500 per day of each violation of the same. In addition, Va. Code § 62.1-44.15 authorizes the State Water Control Board to issue orders to any person to comply with the State Water Control Law and regulations, including the imposition of a civil penalty for violations of up to $100,000. Also, Va. Code § 10.1-1186 authorizes the Director of DEQ to issue special orders to any person to comply with the State Water Control Law and regulations, and to impose a civil penalty of not more than $10,000. Va. Code §§ 62.1-44.32(b) and 62.1-44.32(c) provide for other additional penalties.

The Court has the inherent authority to enforce its injunction, and is authorized to award the Commonwealth its attorneys' fees and costs.

As adequate information was provided with the DMR submitted for the September 2011 monitoring period, no response to this correspondence is required. However, if additional information has been obtained, please provide it, in writing, to DEQ **within 20 days of the date of this letter**. *It is DEQ policy that appropriate, timely, corrective action undertaken in response to a Warning Letter will avoid adversarial enforcement proceedings and the assessment of civil charges or penalties.*

Please advise us if you dispute any of the observations recited herein or if there is other information of which DEQ should be aware. In the event that discussions with staff do not lead to a satisfactory conclusion concerning the contents of this letter, you may elect to participate in DEQ's Process for Early Dispute Resolution. Also, if informal discussions do not lead to a satisfactory conclusion, you may request in writing that DEQ take all necessary steps to issue a final decision or fact finding under the APA on whether or not a violation has occurred. For further information on the Process for Early Dispute Resolution, please visit the Department's website under "Laws & Regulations" and "DEQ regulations" at: http://www.deq.virginia.gov/export/sites/default/regulations/pdf/Process_for_Early_Dispute_Resolution_8260532.pdf or ask the DEQ contact listed below.

Your contact at DEQ in this matter is **Mr. Mike Dare**. Please direct written materials to his attention. If you have questions or wish to arrange a meeting, you may reach Mr. Dare directly at (804) 527-5055 or via email at **Michael.Dare@deq.virginia.gov.** .

Sincerely,

Kyle Ivar Winter, P.E.
Deputy Regional Director

cc: M. Dare – DEQ-PRO Water Compliance (electronic copy)
R. Jenkins – DEQ-PRO Water Permitting (electronic copy)
File/ECM